Adapting pharmacy experiential education during COVID-19: Innovating remote preceptor resources, tools, and patient care delivery beyond virtual meetings

Elaine Law, PharmD, BCPS, Department of Pharmacy Practice, Thomas J. Long School of Pharmacy, University of the Pacific, Stockton, CA, USA

Marie C. Scott, PharmD, Department of Pharmacy Practice, Thomas J. Long School of Pharmacy, University of the Pacific, Stockton, CA, USA

Yong S.K. Moon, PharmD, Department of Pharmacy Practice, Thomas J. Long School of Pharmacy, University of the Pacific, Stockton, CA, USA

Audrey J. Lee, PharmD, BCPS, FCSHP, Department of Pharmacy Practice, Thomas J. Long School of Pharmacy, University of the Pacific, Stockton, CA, USA

Veronica T. Bandy, PharmD, MS, FCPhA, FCSHP, BCACP, Department of Pharmacy Practice, Thomas J. Long School of Pharmacy, University of the Pacific, Stockton, CA, USA

Andrew Haydon, PharmD, Department of Pharmacy Practice, Thomas J. Long School of Pharmacy, University of the Pacific, Stockton, CA, USA

Allen Shek, PharmD, Department of Pharmacy Practice, Thomas J. Long School of Pharmacy, University of the Pacific, Stockton, CA, USA

S. Lena Kang-Birken, PharmD, FCCP, AAHIVP, Department of Pharmacy Practice, Thomas J. Long School of Pharmacy, University of the Pacific, Stockton, CA, USA

Purpose. To describe the innovative teaching practices, tools, and resources for remote learning developed by a school of pharmacy with a decentralized experiential program to empower and support preceptors in response to the coronavirus disease 2019 (COVID-19) pandemic.

Summary. As the pandemic has continued, there have been significant shifts in pharmacy workflow, staffing, and patient care delivery. Pharmacy students are slowly being reintegrated into these learning environments. Although preceptors are willing and eager to teach, many lack the resources, tools, and support to create remote learning experiences at their facilities. The University of the Pacific Thomas J. Long School of Pharmacy has a decentralized experiential education model in which faculty regional coordinators with clinical practices and diverse expertise are disseminated throughout California. This model allowed us to collaborate and understand preceptor needs from a local level. We created a preceptor COVID-19 guidance document, introduced innovative virtual playbooks to pivot up to 100% remote rotations, and promoted the layered learning model to integrate pharmacy residents into the remote teaching space. Communication and flexibility are key to ensure student and preceptor safety while maintaining high-quality advanced pharmacy practice experiences and preserving patient-student relationships in telehealth.

Conclusion. Overall, we successfully created innovative solutions and leveraged our decentralized experiential model to meet the teaching and learning demands during an unanticipated crisis. We continue to adapt and plan to assess the effectiveness of the tools by administering surveys of preceptors and pharmacy students.

Keywords: COVID-19, experiential learning, preceptor, remote resources

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The coronavirus disease 2019 (COVID-19) pandemic required an immediate shift of didactic and experiential pharmacy education to remote learning. In California, "shelter in place" orders were implemented mid-March 2020. This led to a cascade effect, with many hospital and ambulatory care advanced pharmacy practice experience (APPE) sites deciding to suspend student experiential education to mitigate exposure and patient contacts.

As the pandemic continued, pharmacy practice shifted dramatically, including modifications of workspaces due to social distancing protocols and exploration of alternative delivery of patient care. Many pharmacists began working from home, providing operational and clinical services via remote access to electronic health records (EHRs) and performing telehealth. Much of the recent literature on pharmacy education during these practice changes describes the sudden need for a paradigm shift in exploration of nontraditional teaching modalities in experiential education due to the pandemic.[1,2] While preceptors were willing to precept students during the

Address correspondence to Dr. Kang-Birken (lbirken@pacific.edu).

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pandemic, many lacked the resources needed to provide quality APPE experiences remotely. They found the reintroduction of students into this new workflow a challenging process. Many preceptors needed guidance on strategies for offering APPE rotations while minimizing unnecessary exposure to COVID-19 and for managing students who might require self-isolation or quarantine due to possible exposure to COVID-19.

This paper describes the process of how a school of pharmacy experiential program supported and empowered its preceptors with innovative teaching practices, tools, and resources developed in response to the pandemic.

Description of the school of pharmacy experiential program

The Thomas J. Long School of Pharmacy at the University of the Pacific (UOP) is a large, single-campus pharmacy school located in Northern California with an average class size of 200 students. It has a 3-year accelerated doctor of pharmacy (PharmD) program with six 6-week APPE rotations from August to May. Beginning in 1971, UOP developed one of the first decentralized APPE programs in the United States to accommodate the large class size that far exceeded the capacity of medical centers in the vicinity of the school. This APPE program consists of 17 regions throughout California where students can choose to pursue their APPEs. Each region has a dedicated faculty member, herein described as a regional coordinator (RC), who not only coordinates rotation site assignments and facilitates preceptor and regional development, but also has a dedicated practice site within the region to provide clinical services and expertise in areas including general medicine, infectious diseases, emergency medicine, ambulatory care, population health, and clinical research. Given the regional model, each of the 17 RCs has become intimately familiar with their local health systems and provides immediate hands-on support to preceptors, particularly during these difficult times.

KEY POINTS

- A school of pharmacy assembled a task force during the coronavirus disease 2019 pandemic to create a guidance document for preceptors to safely reintroduce students into experiential sites.
- Virtual advanced pharmacy practice experience playbooks consisting of mock activities, patient case repositories, and ASHP Pharmacy Competency Assessment Center modules can be successfully utilized to support the changing needs of preceptors and maintain purposeful clerkship experiences.
- A decentralized experiential model allowed clinical faculty to provide supplemental student learning opportunities to accommodate shifts in preceptor staffing schedules and patient care responsibilities.

Impact of the pandemic on the experiential program

During the initial peak of the pandemic, UOP had lost approximately 220 APPE rotations due to on-site restrictions, warranting an immediate transition to virtual APPE learning experiences to prevent a delay in graduation. The RCs continued to provide meaningful precepting and clinical support at the local level and led efforts in preceptor development to address specific precepting issues during the pandemic. Simultaneously, UOP formed a COVID-19 innovation task force, consisting of the associate dean of professional programs and 7 RCs, to assist the preceptors in navigating this "disruption." The task force developed a COVID-19 guidance document, virtual APPE resources for preceptors, and interregional collaboration opportunities.

The layered learning model was incorporated to help pharmacy residents meet their teaching certificate program requirements and to offload preceptors when needed. Residents were asked, for example, to facilitate remote case discussions under the supervision of an RC, record learning modules, and create assessment teaching materials that could be utilized for remote clinical APPE rotations.

Preceptor resource innovation development

COVID-19 APPE guidance document. Many of our experiential sites host students from multiple schools of pharmacy, which may have different policies and procedures relating to student site placement. Frequently asked questions from sites to the RCs included how to manage students with illness during the pandemic or potential exposure to COVID-19, attendance requirements, remote access to EHR and Health Insurance Portability and Accountability Act compliance, and personal protective equipment (PPE) requirements and provisions. To enhance strong communication between UOP and our sites, the University of the Pacific COVID-19 APPE Guidance Document was created (Table 1). This document was provided to all of our host institutions to assist in the reintroduction or continued presence of students in practice settings. Key components included UOP's role in informing students about safety guidelines during the pandemic, structuring for a modified experiential rotation, and resources for preceptors and students. Students were informed of the Centers for Disease Control and Prevention's COVID-19 health and safety guidelines, site-specific requirements regarding health screening and COVID-19 guidelines, and the policy and procedures mandated by the local public health agency. In terms of

Table 1. Preceptor Resources and Student Learning Tools

Preceptor Resource Innovation	Description
University COVID-19 APPE Guidance Document	• Guidance document on how to safely resume APPEs (either in person or remotely) addressing: ◦ Student onboarding process changes ◦ Structuring a modified experiential rotation ◦ Remote university library access information • Technology tip sheet for preceptors on how to effectively use online video chat applications • Frequently asked questions addressing: ◦ Remote EHR access and HIPAA ◦ Managing illness and attendance ◦ Student COVID-19 exposure ◦ PPE requirements and provision
Remote APPE playbooks for core rotations (internal medicine, hospital practice, ambulatory care, and community practice)	• Mock 6-week calendar with activities to complete 100% remote APPEs in core rotations • Sample activities included: ◦ Integration of ASHP Pharmacist Competency Assessment Center modules ◦ Online patient case simulations ◦ Virtual cleanroom simulation modules ◦ Mock patient consultation cases

Abbreviations: APPE, advanced pharmacy practice experience; COVID-19, coronavirus disease 2019; EHR, electronic health record; HIPAA, Health Insurance Portability and Accountability Act; PPE, personal protective equipment.

structuring rotations, we encouraged and supported on-site rotations as the preferred mode of delivery for core APPE rotations. However, we acknowledged that temporary adjustments to partially or fully remote learning might be necessary.

Virtual APPE playbooks. Virtual APPE playbooks for core rotations (internal medicine, ambulatory care, hospital practice, and community practice) were created to support our preceptors and RCs in anticipation of the worst-case scenario that experiential sites might temporarily suspend their student programs and access would be lost to EHRs, causing pivoting of the core rotations into a virtual format. Playbooks included mock 6-week calendars with activities to meet learning objectives set forth by accreditation standards. Sample activities are summarized in Table 1. All of the playbooks were accessible to the preceptors via a link to shared files. With this resource, the preceptors had the option to use some or all of the content provided to aid in successful completion of rotations regardless of the different models—onsite, hybrid, virtual, or post–COVID-19 exposure self-quarantine. The RCs from multiple regions have collaboratively utilized sections from the virtual APPE playbooks to create interactive activities for students throughout the regions to relieve the preceptors. The calendar proved to be a useful resource for preceptors that assisted in reorganization of in-person rotations to accommodate shift changes for multiple staff pharmacists as a result of the COVID-19 pandemic.

Hospital pharmacy practice playbook. Implementation of a 100% remote hospital practice APPE proved the most challenging to conceptualize given the emphasis on learning and direct participation in the medication use process and in healthcare delivery. The goal for this remote APPE was to combine opportunities for students to understand the inpatient operational aspects of a pharmacy, such as workflow and medication storage, preparation, and dispensing processes, with project-based assignments. As a result, assignments and activities were developed to specifically address a weekly inpatient theme (Table 2). Longitudinal activities included utilization of modules within the online American Society of Health-System Pharmacists (ASHP) Pharmacy Competency Assessment Center (PCAC) e-tool subscribed to by UOP that matched the "themes of the week" and use of an online virtual cleanroom simulation program.[3] We also created activities related to "inpatient problem-solving scenarios" by collating potential questions a staff pharmacist might receive from a physician, nurse, or other staff member. The compilation of scenarios included common questions involving medication administration, compatibility among medications and fluids, duplicate orders, and dispensing issues related to automation. Students would then work through these scenarios using appropriate resources to enhance their understanding of the pharmacy's workflow and the appropriate management of these inpatient pharmacy issues.

Remote APPE students who lacked hands-on hospital experiences were partnered with students who were scheduled for onsite hospital APPEs. The students would complete activities related to the weekly inpatient themes and then engage in topic discussion that integrated actual examples shared by the on-site student. Students participating in this teach-back model

Table 2. Remote Hospital Practice Advanced Pharmacy Practice Experiential Mock Calendar

Week No.	Theme	Example Activities
1	Pharmacy workflow and protocols	Topic discussions • Pharmacy models (centralized vs decentralized) • Pharmacy automation/barcoding • Hospital protocols (eg, renal dosing, IV-PO therapeutic interchange, alteplase)
2	Sterile compounding	• Virtual cleanroom simulation • TPN calculation assignment
3	Medication safety and drug shortages	• Remote P&T meeting attendance • Review MERP, ISMP • Role of medication safety officer
4	Regulatory and legal issues	• Mock joint commission survey assignment • Mock unit inspection • Medication reconciliation role play activity
5	Drug monitoring and clinical services	• Antimicrobial stewardship • Pharmacy per protocol (eg, vancomycin, warfarin, TPN)
6	P&T	• Drug monograph assignment • Mock P&T
1–6	Longitudinal activities	• ASHP PCAC modules, problem-solving scenarios • Projects (eg, IV medication chart of compatibility, maximum concentrations, extravasation management)

Abbreviations: ISMP, Institute for Safe Medication Practices; IV, intravenous; MERP, Medication Error Reduction Program; P&T, pharmacy and therapeutics; PCAC, Pharmacy Competency Assessment Center; PO, oral; TPN, total parenteral nutrition.

provided positive feedback that they benefited from this collaborative team learning model.

Internal medicine playbook. The foundation of this playbook was based on 5 experiential domains: (1) patient workup: assessment and development of therapeutic, monitoring, and educational plans; (2) oral communication; (3) written communication with emphasis on medical record documentation; (4) drug information; and (5) application of clinical protocols. Preceptors could choose to have their students practice various clinical skills that aligned with each domain using skills-based activity strategies and resources included in the playbook. Preceptors could assign students to "work up" patient cases from a variety of sources, including deidentified cases based on real-life hospitalized patients obtained from preceptors and students as well as online patient case simulations. The playbook further detailed the weekly frequency of virtual skills-based activities and assignment of special projects, ranging from preceptor-student role-playing for obtaining a medication reconciliation history to patient education virtual discussions, applying the pharmacist patient care process to present patient cases, note documentation, written responses to virtual drug information questions, or interprofessional in-services

The playbook also included a number of digital resources, such as sample medication histories, chart note templates, monitoring forms, and clinical inpatient protocols (eg, vancomycin area under the curve/minimum inhibitory concentration dosing) for students to use to help prepare for their assigned activities. In an effort to simulate the typical rigor of a 6-week internal medicine APPE, the schedule of "working up" and presenting patients increased in frequency from 4 new patient presentations per week during the first week to 8 new patient presentations by weeks 4 and 5, for a total of 32 student patient presentations. Preceptors could elect to use 3 deidentified progressive cases that consisted of admission and additional clinical data for 2 hospitalization days for students to practice follow-up patient assessments and recommendations. By the final week, students could randomly select patients who were previously discussed to reinforce and summarize clinical pearls and fill gaps of knowledge or introduce new teaching points.

Ambulatory care playbook. This playbook used much of the same strategies and foundations as the internal medicine playbook. Patient care activities included appropriate data collection from chart review and motivational interviews (timed to simulate outpatient clinic appointments), medication reconciliation, assessment and prioritization of problems, formulation of sound therapeutic plans, and efficient communication through chart notes and patient consultation. Project-based activities included preparation of counseling scripts and video recordings of simulated patient counseling sessions.

The development and wide use of telehealth visits in the clinic system has provided opportunities for students to

be involved in patient care remotely. At the discretion of the institution, student participation in telehealth was supported to develop effective communication skills in a live patient care environment. For students who were unable to participate in telehealth responsibilities, as in the internal medicine playbook, simulated deidentified patient cases were available for students to participate in a 100% virtual rotation. To expand the preceptor's toolkit, a collection of the most recent guidelines for the management of chronic disease states such as hypertension, diabetes, anticoagulation, dyslipidemia, chronic obstructive pulmonary disease, and asthma was included as well.

Community pharmacy practice playbook. Because most community practice sites continued to precept students during the pandemic, a full 6-week playbook was not necessary. Instead, a 2-week module of remote learning activities was developed for students who might be displaced for a short period of time due to an illness or COVID-19–related quarantine. The playbook focused on students practicing skills-based activities, including motivational interviews and consultations. Students were asked to record themselves conducting mock patient interviews and providing patient consultations for common prescription and nonprescription medications. The playbook also included resources such as product review assignments for nonprescription medications and case-based law questions as pertinent community practice educational materials. Finally, objective structured clinical exams (OSCEs), a formalized process to assess students' clinical knowledge and communication skills, were suggested using a virtual platform. OSCEs can be performed using mock patient encounters to assess students' ability to gather pertinent patient information, verify medication orders, or communicate with a patient regarding selection of nonprescription medications. Indeed, some students have been displaced for 1 or 2 weeks due to exposure to COVID-19, and this playbook proved to be practical and useful.

Interregional rotation and teaching collaboration

To ensure that students met the experiential educational requirements and competencies during the pandemic, innovative interregional educational opportunities were implemented through collaboration of the RCs. Because the RCs serve as clinical pharmacist preceptors at their primary host site, many offered to help facilitate case discussions or journal clubs related to their area of expertise using web-based platforms for preceptors across regions who requested precepting leverage. Innovations in this area are summarized in Table 3.

Student-led experiential innovation task force. The most challenging aspect of precepting internal medicine rotations remotely was the inadequate availability of a range of "real" patient cases. Therefore, a student-led experiential innovation task force was formed. For each APPE block, the task force recruited up to 12 students who had on-site internal medicine APPEs to participate in weekly group case discussions moderated by an RC, the director of professional programs, and/or a postgraduate year 1 (PGY1) resident. In collaboration with their preceptors, each student lead identified one unique patient case per week that the student had followed through the patient's hospitalization. The case discussions were ongoing and conducted virtually, allowing any student to participate with the preceptor's permission. For example, students currently in hybrid or virtual models at their institutions could participate along with those who might be displaced for a limited time such as for self-quarantine.

This innovation produced several positive outcomes. First, an opportunity to present previously vetted patient cases helped student leads build their presentation skills and confidence. Second, presenting clinical pearls to other students and gaining additional perspectives from peers rotating at other hospital sites and from the moderating faculty with clinical experience and expertise enhanced learning for all participants. Finally, cases presented helped to build a case repository to teach any displaced students during this pandemic or any other disasters in the future.

Community outreach through joint virtual drug information rotation. Early in the pandemic, a 100% remote drug information elective APPE was promptly created by 3 RCs to support 9 students who were abruptly displaced from sites throughout California. In addition to drug information assignments, the students participated in interregional rapid review and analysis journal club presentations, discussions, and debates. Students became part of a COVID-19 drug information task force whose longitudinal project was to create a multimedia information platform to dispel myths regarding COVID-19 in the early stages of the pandemic. Using rapid analysis journal club skills, the students evaluated a plethora of COVID-19 publications and formulated clear and concise responses to debunk pandemic-related misinformation. The students also learned how to create online flyers and memes for the postings and created hashtags that would attract public interest and increase page visibility. A webpage (https://sites.google.com/u.pacific.edu/uopcovid/home?authuser=0&fbclid=IwAR1FXwOvoWJP-sPYwoUHDsSZn6MyfVet381M2z7qeLUY2w0nwtA6qum-KOc) was quickly launched, and 24 postings with reputable references were published on the website and social media over the course of 5 weeks. Because of the success of the website, a local news station interviewed a faculty lead and student involved with the project, highlighting the innovative learning experience and the public service in providing vital COVID-19–related education in a fun and creative format.[4]

Discussion

During the pandemic crisis, our primary concern was to create meaningful learning experience for students on APPE programs without increased risk of infection or transmission of COVID-19. As many rotations pivoted to a

Table 3. Utilizing Alternative Precepting Approaches: Interregional Collaboration and Layered Learning

Model	Components	Activities
Interregional teaching precepting collaboration model	Virtual APPE grand rounds	• Simulate on-site grand rounds with a focus on presenting up-to-date clinical data and generate discussion on relevant pharmacy topics • Invitation to all students and preceptors from all 17 APPE regions • Students assigned novel pharmacy topics or current issues of general interest to present such as: ◦ Medication safety issues (medication errors and adverse drug event reporting, MERP) ◦ COVID-19 treatment updates ◦ Handling drug shortages
	Remote internal medicine group case discussions	• 8-12 students doing on-site internal medicine rotations volunteer to participate in weekly group case discussions • Student leads charged to identify unique patient cases with hospital course follow-up, in collaboration with their preceptors • Hone student presentation skills and gain additional perspectives from peers rotating at other hospital sites • Discussions facilitated by faculty regional coordinator and director of professional programs • Contribution to building case repository for displaced students
Promoting the layered learning model	Pharmacy resident facilitators in remote activities	• Integrate remote teaching responsibilities into resident teaching certificate programs • Fulfill precepting/teaching requirements for ASHP accreditation of residency programs • Example activities include: ◦ Participation in internal medicine case discussions ◦ Recorded learning modules on pharmacy topics and student-appropriate assessment questions (eg, biostatistics, dialysis, etc)

Abbreviations: APPE, advanced pharmacy practice experiential; COVID-19, coronavirus disease 2019; MERP, Medication Error Reduction Program.

100% remote or hybrid model, the UOP COVID-19 Innovation Task Force was quickly formed to produce a COVID-19 guidance document and other resources, including virtual APPE playbooks, to support experiential sites and preceptors. The RCs in the decentralized experiential regions maintained close communication with the sites and created collaborative rotations and interregional learning opportunities using their areas of clinical expertise. Despite our success, intra- and interregional communication between preceptors and RCs and among the RCs was challenging at times. It was difficult to track the abundance of information shared via email among the RCs and the COVID-19 Innovation Task Force. A shared drive was thus created to save curated documents and resources in a single, easy-to-access location. RCs were then encouraged to regularly update tools and resources in the shared drive, particularly those used for interregional teaching activities.

A second challenge that arose during the pandemic was related to the surge of technology. Online video conferencing platforms became the main mode for meetings or any interactions between preceptors and students. UOP quickly increased access to video conferencing platforms for RCs and students and provided a brief tutorial on how to use the tools. However, many preceptors lacked proper training or equipment or experienced connectivity issues at experiential sites. To address these issues, we plan to create instructions and helpful tips on how to effectively use and create interactive learning sessions. Telehealth is another technological breakthrough since the early stages of the pandemic. Given the high satisfaction rate reported among patients and providers for this remote patient care delivery, telehealth is likely to continue even after the pandemic.[5] We further plan to implement strategies to incorporate technology and telehealth approaches for fostering effective communication and motivational interviewing skills.

Conclusion

Overall, we successfully created innovative solutions and leveraged our decentralized experiential model to meet the teaching and learning demands amid the COVID-19 pandemic. However, our experience also reminds us of the importance of remaining flexible during unforeseen crises and maintaining open communication with preceptors to stay current with the status of each institution's pandemic workflow management and the preceptor's needs as we transitioned to remote experiential learning. Verbal preceptor feedback has been overwhelmingly positive regarding our resources. Preceptors have reported that they appreciate the diversity of options made available to them to tailor their remote rotations. In the near future, we plan to conduct surveys of students and preceptors to garner feedback and

compare student experiences on remote rotations vs on-site rotations to further improve our experiential program.

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