

COVID-19 SPECIAL COLLECTION

PROGRAMME DESCRIPTION

Redesigning the advanced pharmacy practice experiential education from hospital to home: A COVID-19 scenario

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Keywords

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Abstract

Introduction: During the 2020 COVID-19 pandemic, suspension of many educational activities occurred to mitigate the risks of infection spread. For pharmacy students in their internship year, many efforts have been made to move their experiential training to a virtual platform without compromising learning outcomes. **Objectives:** Redesign the advanced pharmacy practice experience (APPE) to remote learning without compromising the learning outcomes; Develop an appropriate teaching modality/strategy and assessment method for remote APPE; To drive the change in experiential education by providing guidance for other pharmacy schools dealing with similar situations. **Restructured APPE:** Eighty-seven interns were switched to an online internship with five specialties based on the availability of the preceptors, namely internal medicine, infectious diseases, oncology, total parenteral nutrition, and psychiatry. Experiential education activities such as drug information questions, case presentations, and clinical pharmacy topic discussions took place on virtual platforms. Student assessment was done using adjusted rubrics to suit the online platforms. Student feedback was taken using an online questionnaire and was mostly positive, indicating that they improved their clinical pharmacy knowledge. **Conclusion:** The authors highlighted the various restructuring modalities and learning methods used for different clinical rotations to achieve the learning outcomes in difficult situations. In future, the authors plan to work with their colleagues in other health colleges to adapt their practices together.

Introduction

Pharmacy workforce and pharmacy education in Saudi Arabia have grown quickly over the last decade (Almaghaslah *et al.*, 2019). Correspondingly, an increase was observed in the number of pharmacy schools. There was only one school in 2000, 18 in 2010, and now, 30 in 2020 (AlRuthia *et al.*, 2018). The majority of pharmacy colleges in Saudi Arabia offer the Doctor of Pharmacy (Pharm.D.) to ensure that Saudi pharmacy graduates are

equivalent to those graduating from the pharmacy schools in more developed countries. Hence, pharmacy schools in the kingdom prefer a Pharm.D. curriculum that aligns with the programmes of pharmacy schools in the USA and Canada (Asiri, 2011; Dutta, 2005). The USA Accreditation Council for Pharmacy Education (ACPE) state that upon completion, the pharmacy students need to be competent to practice independently and to ensure optimal pharmaceutical care outcomes (American Council

for Pharmacy Education, 2016). Therefore, Imam Abdulrahman Bin Faisal's Pharmacy College considers Advanced Pharmacy Practice Experience (APPE) rotations as an integral part of shaping and strengthening the Pharm.D. Programme. This supports the students to develop self-confidence, proficiency, and independent practice and gives each student various opportunities to conduct major patient care duties in different clinical practice settings (Asiri, 2011).

The first confirmed case of COVID-19 in Saudi Arabia was reported on March 2nd 2020 (Barry *et al.*, 2020). On the 8th of March, the Ministry of Education announced that public and private schools, as well as universities, would be closed (Dutton, 2020). As part of precautionary measures, curfews were imposed all over the kingdom which had an adverse impact on all sectors, including teaching and training activities at schools, colleges, and hospitals. Correspondingly, all educational institutions started to rely on online resources to deliver their coursework (Kawaguchi-Suzuki *et al.*, 2020). To avoid the long interruption in APPE rotations and to ensure students will graduate on time, the IAU college of pharmacy training committee decided to start virtual internships by using online platforms via video streaming solutions. In this paper, the authors present their experience of restructuring APPE rotation from hospital to home to avoid the risk of exposure to COVID-19.

Objectives

- Redesign the APPE to remote learning without compromising the learning outcomes;
- Develop appropriate teaching modality/strategy and assessment method for distant APPE;
- To drive the change in experiential education by providing guidance for other pharmacy schools dealing with this global pandemic.

Programme description

Imam Abdulrahman Bin Faisal University (IAU) is a governmental institution located in Dammam, Saudi Arabia. Its School of Clinical Pharmacy offers a six-year full-time Pharm.D. programme including one year of APPE hospital rotations which consists of seven core and three elective rotations (IAU, 2020). Each rotation is five weeks long. All course learning outcomes are structured as per the Saudi National Commission for Academic Accreditation & Assessment (NCAAA) standards (Education & Training Evaluation Commission, 2018). The pharmacy interns are

allocated to 20-25 affiliated training sites to accomplish their APPE rotations under the supervision of well-trained clinical preceptors. The training sites vary between governmental or private hospitals, regulatory organisations, and pharmaceutical companies. The intern-preceptor ratio ranges from 1:1-3. APPE rotations in the college of clinical pharmacy are under the supervision of the Vice-Dean of research and training and the Experiential Educational Committee, consisting of two professors from the pharmacy practice department, clinical preceptors, and teaching assistants (TA).

Challenges

The interns had completed an average of seven APPE rotations before the pandemic. They lost approximately three weeks of their ongoing rotations due to the suspension of students at affiliated hospitals and some zones of the country being under confinement. Interns were expected to complete their APPE rotations by the end of July 2020. Therefore, the first challenge was the effective utilisation of time, in particular the requirement for interns to complete 160 hours of supervised practice under each speciality. Secondly, the majority of preceptors in the hospitals were busy managing the additional hospital workload due to the pandemic. Similarly, few of them were familiar with remote education and consequently, a large number of students had to be distributed among limited preceptors. Lastly, a limited number of interns may have had to move to a rotation they had already repeated.

Proposed scheme

Without affecting the integrity of learning outcomes and achievements, a virtual experiential education strategy was proposed, based on a backward design method. Here, the authors define the learning objectives, decide on the acceptable methods for measuring the learning outcomes and develop the learning experience. The majority of rotation-specific clinical activities was placed under one of four NCAAA domains, namely knowledge, cognitive skills, interpersonal and responsibility skills, and communication skills (Table 1) (Education & Training Evaluation Commission, 2018). A holistic assessment method, concentrating on continual quality improvement, was also considered. Activities that expand the students' clinical skills and critical thinking were developed and executed. Both synchronous (video conferencing, live chat) and asynchronous online methods (e-mail, videos, discussion forum) for learning were adopted.

Table I: Proposed plan for virtual internships

Learning domains	Teaching modality	Teaching strategies	Assessment methods
Knowledge	Online video interactions Reading Simulated videos Shared folders E-mails	Short group discussion Large group lecture Brainstorming Case discussion and presentation Journal club	Rubrics Assignments Portfolio or end rotation documentation Short questions (Viva)
Cognitive skills	Online video interactions Simulated videos Simulated patient	Case discussion and presentation Journal club	Problem solving exercises Rubrics
Interpersonal skills & responsibility	Online video conference	Verbal instructions Group discussion Immediate feedback	Performance level rubrics Observation (participation)
Communication Skills	Simulated patient Online video interaction	Patient counselling Medication history	Rubric Performance level rubrics (Viva)

Virtual internship pre-rotation activity

Eighty-seven interns were given the opportunity to select a virtual internship. Once assigned the APPE, interns received an introduction by the Vice-Dean for Training and Research who described the purpose of overall activities of the virtual rotation and ensured the students completely understood their responsibilities. All students were asked to revise the rotation-specific knowledge by undertaking the recommended readings mentioned in the training manual. Likewise, interns were asked to communicate with their peers who had completed the specific rotations before COVID-19. For example, units like psychiatry have a rotation-specific manual, comprised of a rotation description, goals and objectives, activities involved, topics for discussion, and references. This enables students to understand how they are supposed to perform under each rotation-specific activity in the units.

Restructuring the APPE rotation

The online internship commenced with five specialties based on the availability of the preceptors, namely internal medicine, infectious diseases, oncology, total parenteral nutrition (TPN), and psychiatry. Two teaching assistants (Pharm.D. graduates with experience in APPE rotations) were assigned to each preceptor to facilitate the rotations. A student leader was nominated from the

respective rotation to facilitate telecommunication. An ‘APPE Virtual internship’ team was launched, including the Vice-Dean of Training, members of the Experiential Education Committee, preceptors, and TAs involved in remote APPE as well as both male and female student leaders.

An internship programme should enhance students’ learning experiences by developing competencies and skills necessary for them to become highly functional, competent pharmacists. Interns should participate in a comprehensive patient care delivery experience, understanding the importance of each step along the way. Therefore, recommending all possible clinical activities, excepting the ward round participation at this critical time, was endorsed. To complete this, various online communication forms like office chatting, video conferences, simulated videos and patients (preceptors acted as simulated patients), file sharing and storage were used for communication.

Each specific rotation was planned to achieve the NCAAA’s four domains (Education & Training Evaluation Commission, 2018). During the first day of the week, activities were included to assess the knowledge domains such as topic presentation and discussion. The remaining days focused on communication skills and cognitive skills through various clinical activities like the medication history interview and patient counselling, drug information, and creating a therapeutic plan for both real and hypothetical cases (Table II).

Case presentation

Case presentation is an interactive, student-centred exploration of a realistic or specific narrative that provides useful materials and support for inductive learning. The students are asked to solve questions that have no single answer. This fosters critical thinking, encourages responsibility, and transfers information, concepts, and technique into practice. Similarly, it enables the interns to use self-questioning and self-directed learning. A hypothetical case, case bank (cases available to the preceptors based on previous experience), or simulated patient (preceptor as a simulated patient) was broadcasted to students via different online resources. The presentation was either synchronised or asynchronised, based on the speciality of rotations.

Topic discussions

Preceptors scheduled meetings for the discussion of various topics with students. Background readings were

Table II: Restructured APPE

Day	Clinical activity	Methods	Online tool	Time
Sunday	Introduction to rotation	Short lecture and large group discussion Reading	Zoom/shared folders	08.00 - 09.50 a.m.
	Topic discussion and presentation	Brainstorming, reading, and short group discussion	Zoom	10.00 - 11.50 a.m.
	Drug information question	Short group discussion	MS Office/Zoom	01.00 - 3.00 p.m.
Monday	Case discussion	Short group discussion Hypothetical case Video	Zoom/MS office	08.00 - 09.50 a.m.
	Treatment chart review	Short group discussion	Remote access to the hospital system	10.00 - 11.50 a.m.
	Medication history interview	Video and reflexion	Simulated video/social media platform/Medscape/YouTube	01.00 - 3.00 p.m.
Tuesday	Case discussion	Short group discussion Hypothetical case Video	Zoom/MS office	08.00 - 09.50 a.m.
	Rotation-specific activity	Short group discussion	Zoom/MS office	10.00 - 11.50 a.m.
	Assignment	Short group discussion	Zoom	01.00 - 3.00 p.m.
Wednesday	Patient counselling	Video and reflexion Simulated patient	Simulated video/social media platform	08.00 - 09.50 a.m.
	Journal club	Short group discussion	Zoom/MS office	12.00 p.m.
	Rotation-specific activity	Short group discussion	Zoom/MS office	03.00 p.m.
Thursday	Case presentation	Simulated patient	Zoom	08.00 - 09.50 a.m.
	Rotation-specific activity	Short group discussion	Shared folders	12.00 p.m.
	Short questions (Viva)		Zoom/MS office	01.00 - 03.00 p.m.

provided when available (some suggested readings listed with topics in this section). Brainstorming sessions were carried out before each topic discussion. Topic discussions were conducted in small groups of five to six students, and large group discussions consisted on average of ten to 15 students.

Journal club

At present, journal club is considered as the most common tool in almost all educational programmes. During the APPE, journal club enhanced the interns’ literature-evaluation skills with clinical expertise, relating published literature to clinical practice to draw conclusions. Hence, it was sensible to resume the journal club in a similar style as before the COVID-19 pandemic. A topic was announced by the preceptor and small group discussions were then carried out under the supervision of TAs, followed by a large group presentation.

Treatment chart review

A treatment chart review enables the interns to define errors in the ordering, recording, distributing, administering, and monitoring of medication. Moreover, it enables the interns to identify potential adverse reactions and drug interactions. During the virtual internship, a retrospective chart review was made by using remote access to the

hospital system. Since one of the rotation sites was the university hospital, the preceptors made a special request to acquire remote access to the hospital database ‘QudraMed’. The preceptors made the screens available for students and a live session was created to simulate the hospital chart review. Later, a discussion was carried out about the identified medication related problems.

Medication history interview

Taking an accurate medication history is crucial in the pharmaceutical care process for the early detection and management of adverse drug reactions, drug interactions, and medication adherence. A virtual case was provided to the students by using free online resources such as YouTube and Medscape. Later, students were asked to create a reflection of this audiovisual, followed by a small group discussion or debate on these reflections.

Rotation-specific activity

In order to achieve the rotation-specific goals, besides the general activities mentioned in Table II, APPE students undertook several rotation-specific activities (Table III). The authors ensured that all rotation-specific activities also met the four domains of NCAAA. In psychiatry, students were asked to involve the MSE interpretation

and medication adherence improving strategies. In oncology, students participated in writing a pharmacotherapy care plan, using five-point evidence blocks. In the infectious disease rotation, APPE students were provided with additional two weeks of training to learn more about the current COVID-19 pandemic. Here, the authors focused on evidence-based care for COVID-19 patients. Focus group discussions included the screening, prevention, management, and psychological aspects of the COVID-19 pandemic on the role of pharmacists. In order to mimic hospital experience, the authors prepared three interactive COVID-19 cases in which students applied the knowledge gained during the two weeks of developing a pharmacotherapy plan. The cases differed in severity and approach, including two critically ill patients and one with moderate severity. The approach was based on the latest available evidence and gave students the chance to see first-hand the role of pharmacists in caring for these patients. The focus was on tailoring a regimen, adjusting the doses, discussing possible drug-drug interaction, and when to use each agent based on severity and patient scenario. Training in TPN covered designing parenteral nutrition formulation and guidelines for safe preparation, administration of parenteral nutrition, and preventing and treating nutrition support complications. Internal medicine focused on practice-related issues such as TDM of anti-epileptic drugs, in-hospital management of hyperglycemia, atrial fibrillation, and anticoagulation issues.

To emphasize the significance of pharmacists' responsibilities in emergencies or disaster management, an additional two weeks were provided for COVID-19 specific topics. This rotation enabled interns to understand the integral role of pharmacists in delivering evidence-based care for a life-threatening pandemic like COVID-19, where a definitive treatment is unavailable. Topics are framed according to the updated day-to-day COVID-19 treatment strategies. Likewise, to raise the awareness of APPE interns for the screening of mental health problems and to develop their social commitments, additional topics such as substance abuse during COVID-19 and the role of pharmacists in the management of PTSD have been considered.

Contact hours of APPE virtual rotation

During the COVID-19 pandemic, APPE students were provided with an average of four to five hours of activity with their supervisor and TA. Similarly, at the end of each meeting, interns had about three hours of allotted readings, assignments, and activities to complete before the next session on the following day. During the

weekends, interns had nearly four to five hours of additional assignments and activities to finish. Therefore, on average, APPE students had a total of 45 hours of internship experience for fulfilling the rotation requirements. This is similar to the regular internship rotation contact hours.

Assessment

In any learner-centred programme, continuous quality improvement is mandatory. The preceptors evaluated the students daily via videoconference sessions, based on achievements of the predefined goals and objectives for a respective rotation. During the assessment, interns were evaluated based on their interactions with preceptors, TA, through the daily discussions with the preceptor concerning patient care. The authors decided to continue the same assessment methods that were used before virtual internships, by excluding the midpoint evaluation rubrics. Therefore, the mid-point evaluation was made through either Viva/short questions or short problem-solving exercises. The preceptors completed the final written evaluation at the end of the rotation, according to School of Pharmacy criteria that were set before COVID-19. The same rubrics of case presentation, journal club, and the performance level were used by excluding some criteria. For a more precise assessment, additional assignments were considered during the virtual internships. At the completion of their internship, APPE interns were asked to submit a complete portfolio.

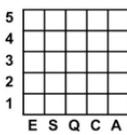
Students' feedback

An online survey was sent to all interns after completing the restructured virtual APPE. All 87 students who took the virtual internship viewed the survey, 67 started, and only 48 (55%) completed the survey. The survey consisted of six Likert-scale questions and three open comment questions. Of the 48 who completed the survey, around 56% (n=27) of the interns agreed or strongly agreed that the restructured APPE allowed them to achieve specific learning outcomes. In addition, most students (n=28, 58%) agreed that the length of the rotation was appropriate. A total of 38 interns (80%) agreed that the content was communicated clearly. Overall satisfaction with the virtual training was achieved by 58% of interns, likewise, 52% of them reported that the virtual internship met their expectations. Virtual case presentation (87%) and journal club (85%) were the most favoured aspects of the virtual internship by the interns. Likewise, 85% of the students stated that an approximate of 85-95% of the clinical skills were achieved through virtual internships during this global pandemic.

Table III: Rotation-specific activities

Rotation	Clinical activity specific to rotation
Psychiatry	<p>Performing TDM for patients Faculty preceptors provided the APPE students with a made-up or anonymous patient case with the relevant information needed for writing a TDM note</p> <ul style="list-style-type: none"> Preceptors provided the APPE students with a hypothetical case; relevant information needed to write on TDM interpretation of mood stabilisers such as the reason for low or high level. Interventions to be taken for correction of the same <p>How to interpret MSE</p> <ul style="list-style-type: none"> Preceptors provided the interns with a simulated video from a free online platform, students were later asked to write a reflection on the video Explain the importance of MSE for pharmacists <p>Scales for detection of adverse drug reactions in psychiatry</p> <ul style="list-style-type: none"> An assignment was given to the students regarding scales used in psychiatry, they were asked to present a power point presentation in two groups, later a debate between these groups was conducted <p>Medication adherence in psychiatry</p> <ul style="list-style-type: none"> Mock case discussions were held to identify the barriers and reasons for medication adherence A discussion was held on how to counsel patients on medication adherence issues in psychiatry <p>Substance abuse</p> <ul style="list-style-type: none"> A small group discussion was conducted on substance abuse issues and the role of pharmacists in managing substance abuse
Infectious disease (ID)	<p>Management strategy for MRSA bacteria</p> <p>A real case with MRSA bacteraemia was given to students, requiring them to recommend first-line management, a discussion was held and later the information was conveyed to the ID team</p> <p>Performing TDM for patients</p> <ul style="list-style-type: none"> Preceptors provide the students with a hypothetical case and relevant information needed to discuss TDM interpretation for Vancomycin and Aminoglycoside <p>Principles of the antibiotic stewardship programme (ASP)</p> <ul style="list-style-type: none"> A large group discussion was held on different media of cultures, staining methods, and interpretation of sensitivity testing A formulary management exercise was provided, focusing on empirical antibiotic therapy approaches and de-escalation principles A mock case discussion was conducted on antimicrobial regimen tailoring, based on the agent coverage, pharmacokinetic consideration, and penetration <p>Role of pharmacists in managing COVID-19</p> <ul style="list-style-type: none"> The journal club was conducted on a meta-analysis on modes of transmission of COVID-19 by a group of interns Literature reviews were conducted on available guidelines and evidence related to COVID-19 Large group discussions were conducted on the management of suspected and confirmed cases of COVID-19 Case presentation was carried out on a hospitalised case of moderate and severe critically ill COVID-19 A discussion group was conducted on updated on vaccines in the pipeline for the novel disease Part of the COVID-19 IVIG usage protocol An assignment was submitted on the role of antithrombotics in COVID-19 An assignment was submitted on pharmaceutical care services of a COVID-19 positive psychiatric patient A lecture was delivered on the role of pharmacists in prevention of substance abuse during COVID-19 A discussion forum was hold on the role of pharmacists in management of post-traumatic stress disorders during COVID-19
Oncology	<p>Interpretation and application of guidelines in oncology cases</p> <ul style="list-style-type: none"> A hypothetical case of breast and prostate cancer was presented to the interns and they were asked to do a pharmacist assessment based on the provided subjective and objective data and to provide an appropriate first-line treatment plan by interpreting the available oncology clinical guidelines <p>Assessment of evidences by using five points evidence blocks in oncology</p> <ul style="list-style-type: none"> Once interns provided the first-line treatment plan for the hypothetical cases, they were asked to grade the evidences regarding the efficacy, safety, quality of evidence, consistency of evidence, and affordability of regimen

Table III: Rotation-specific activities (continued)

<p>Oncology</p>	<p style="text-align: center;">FIRST-LINE THERAPY</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Sunitinib (category 1) </p> <p>or Temsirolimus (category 1 for poor-prognosis patients) </p> <p>or Temsirolimus (category 2B for selected patients of other risk groups) </p> <p>or Bevacizumab + IFN (category 1) </p> <p>or Pazopanib (category 1) </p> <p>or High dose IL-2 for selected patients </p> <p>or Axitinib </p> <p>or Sorafenib for selected patients </p> </div> <div style="width: 45%; text-align: center;">  <p>E = Efficacy of Regimen/Agent S = Safety of Regimen/Agent Q = Quality of Evidence C = Consistency of Evidence A = Affordability of Regimen/Agent</p> </div> </div> <p style="text-align: right;">Figure A</p> <p>Optimisation of drug therapy for oncology cases</p> <ul style="list-style-type: none"> • Discussion was held concerning the selection of hormonal therapies in pre- and post-menopausal breast cancer patients and interns were asked to optimise the drug therapies based on the menopausal history and what would be the appropriate duration of therapy (five years versus ten years), considering efficacy and safety of Tamoxifen • Optimisation of drug, dose, and duration of bone-modifying agents in breast and prostate cancer patients for both prophylaxis and skeletal metastasis • Optimisation of drug therapy in metastatic refractory prostate cancer patients in view of chemotherapy and hormonal agents • Optimisation of dosing in neutropenia and renal and hepatic dysfunction was discussed and interns were asked to apply it in the provided mock cases • Optimisation of breast cancer drugs in BRCA1 and BRCA2 was discussed <p>Supportive care in oncology patients</p> <ul style="list-style-type: none"> • Group discussions were held on the management of acute and delayed nausea and vomiting in chemotherapy patients • Group discussion was conducted for the management of anaphylactic/hypersensitive reactions to antineoplastic agents • Interns were asked to review literature regarding the primary and secondary prophylaxis of neutropenia in chemotherapy patients • Supportive care for peripheral neuropathy and cardiotoxicity was discussed in regard to the respective drugs <p>Incidence and prevalence of febrile neutropenia in chemotherapy patients</p> <ul style="list-style-type: none"> • Interns were asked to submit an assignment on febrile neutropenia which should cover the signs and symptoms, commonly isolated microorganisms in cancer patients, selection of antimicrobial agents for prophylaxis and empirical therapy, use of growth factors, and frequency of monitoring <p>Application of treatment modalities in oncology and intent to treat</p> <ul style="list-style-type: none"> • A detailed lecture was delivered on the practical application of treatment modalities like surgery, radiation therapy, chemotherapy, immunotherapy, hormonal therapy, and nuclear medicine • Selection of neoadjuvant and adjuvant therapies based on the cancer stage and surgery feasibility • The lecture also included the intension to treat, curative, salvage, and palliative therapy <p>Medication adherence in oncology</p> <ul style="list-style-type: none"> • A mock case was discussed on the significance of patient counselling to ensure the medication adherence which can directly affect the treatment results • The discussion also included the format and steps involved in patient counselling which can influence the patient
<p>Internal medicine</p>	<p>Critical appraisal of clinical and observational trials and applying them to clinical practice</p> <ul style="list-style-type: none"> • Students were assigned recent studies (observational studies and randomised controlled trials RCTs) and asked to fill out a critical appraisal checklist • A discussion was held on how the clinical trials can be applied to current practice <p>Case discussions</p> <p>Faculty preceptors provided the APPE students with a made-up or anonymised patient case with the relevant information needed to write a TDM note</p> <p>Performing TDM for patients on phenytoin and valproic acid:</p> <ul style="list-style-type: none"> • An antiepileptic case was given to students to solve, using a provider communication note followed by a discussion on utility and practical aspects of using TDM on antiepileptic medications and applying it to the case • A model case was provided to discuss the practice of anticoagulation clinics • A detailed, case-based discussion was conducted in pharmaceutical delivery of the most common disease like Diabetes <p>Drug information questions</p> <ul style="list-style-type: none"> • Drug information questions were retrieved from the drug information centre records and students were asked to answer them in a timely manner
<p>TPN</p>	<p>Designing parenteral nutrition formulation</p> <ul style="list-style-type: none"> • Interns were asked to practice by the most recent guideline from the American Society for Parenteral and Enteral Nutrition • A large group discussion was held on assessing malnutrition, determining nutritional requirements, and performing the necessary calculations • Preceptors divided the interns into five groups and provided a hypothetical case to practice the practical application of designing TPN formulation and writing the order <p>Describing the guidelines for safe preparation and administration of parenteral nutrition</p> <ul style="list-style-type: none"> • A lecture was delivered on important considerations for stability and compatibility in TPN preparation, use of IV filters for TPN administration, and the appropriate hang-time depending on the type of TPN • An assignment was submitted for solutions to prevent calcium phosphorus incompatibility <p>Preventing and treating nutrition support complications</p> <p>Preceptors provided the interns with real cases from the hospital. A discussion was conducted on all types of complications and interns were able to identify multiple solutions for treating the patient-specific complications</p>

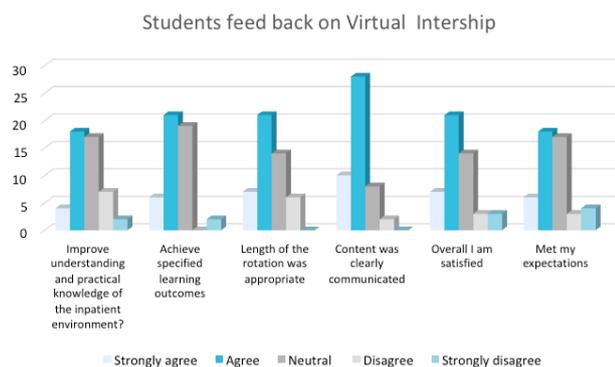


Figure B: Interns’ feedback

Overall, the learners’ feedback indicates that the redesign, content, and mode of delivery met their learning needs. More than half of the survey participants agreed that the redesigned APPE rotations helped them to understand the content and achieve the learning outcomes. Therefore, they suggested this may be considered as a learning strategy in case of a similar emergency situation in future. However, they also emphasised that virtual internships cannot replace onsite training. Open-ended questions in the feedback survey indicated that interns generally perceive that the redesigned APPE rotation benefitted their practice experience in some ways. Students noted the following:

- ‘Expecting that it will be really a boring lecturing internship repetition of what we learn in the theory: BUT IT WAS NOT’
- ‘I love the idea of simulated patient more than the simulated videos’
- ‘I’m happy that we are learning ourselves and preceptor filling the gaps’
- ‘I wish we could also do more simulated evens that might happen during ward rounds or patient education’
- ‘Excellent and effective training, but I prefer if the class timings were regular, instead of having morning and evening classes’

Discussion

In this study, the authors presented the experience of faculty preceptors in transforming the APPE student experience into virtual platforms, in response to a global pandemic. In hospital or clinical pharmacy experiences, students are expected to apply their knowledge and skills in patient care activities (Kahaleh & Murphy, 2005). Due

to the infection risk of hospital pharmacy placements during the novel COVID-19 pandemic, innovating new modalities of these experiences was required.

It has been well documented in the literature that the use of videoconferencing is a useful educational modality in clinical sciences (Augestad & Lindsetmo, 2009; Stain *et al.*, 2005). It is also reported that videoconference sessions of APPE rotation were effective and successful. Similarly, preceptors, college administrators, and interns believe that the video conference offers a better experience to students in the absence of real experience of clinical settings (Eiland *et al.*, 2018). Additionally, it is stated that online virtual patient cases and self-paced online transition modules are effective for pharmacy education (Al-Dahir *et al.*, 2014; Tchen *et al.*, 2018). Ohinmaa *et al.* (2002) reported that, compared to conventional methods, video conferences are also cost-effective. Therefore, the authors believe that virtual APPEs are an appropriate solution for providing a simulated pharmacy practice experience.

During these unprecedented times, many pharmacy schools are using innovative methods to provide students with experiential education (Kawaguchi-Suzuki *et al.*, 2020). Some pharmacy schools have published their administrative and operational experience (Draugalis *et al.*, 2020). Internationally, several other institutions have documented their altered educational modalities (Fuller *et al.*, 2020; Lyons *et al.*, 2020). Locally, other pharmacy colleges in Saudi Arabia have documented their transformation into a virtual mode (Badreldin *et al.*, 2020). Hopefully, these learned lessons will provide the pharmacy education community with guidance to facilitate developing disaster management plans and adapting their programmes to more flexible models.

Limitations

This is a single-institution experience. Also, due to the sudden nature of the pandemic and its lockdown measures, the authors had limited time to plan their restructuring modalities. In addition, they had limited staff participating in their restructuring experience as the hospital and practice partners were having maximum capacity on the frontlines of the COVID-19 pandemic.

Conclusion

This paper presents redesigned APPE training of one of the top universities in Saudi Arabia. The authors highlighted the various restructuring modalities and

learning methods used for different clinical rotations to achieve the learning outcomes in remote learning situations. The authors firmly believe that this paper may guide other institutions in similar circumstances in the future.

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