Curricular Integration of the Pharmacist's Patient Care Process (PPCP)

Nibal Chamoun (✉ nibal.chamoun@lau.edu.lb)

<https://orcid.org/0000-0002-0987-296X>

soumana C. Nasser

Lebanese American University School of Pharmacy <https://orcid.org/0000-0003-4202-7116>

Yara M. Kuyumjian

Lebanese American University

Hani Dimassi

Lebanese American University

Research article

Keywords: PPCP model, Pharmaceutical Care and Dispensing Laboratory, Pharmacy Curriculum

Posted Date: July 28th, 2019

DOI: <https://doi.org/10.21203/rs.2.12021/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background The Accreditation Council for Pharmacy Education (ACPE) standard 10 specifies the need to prepare students to provide patient-centered collaborative care through both the didactic and experiential pharmacy curriculum. The aim of this study is to assess the impact of a newly introduced PPCP based laboratory course on students' perception of their preparedness to apply PPCP steps in introductory pharmacy practice experiences (IPPEs). **Methods** In spring of 2017, PPCP was introduced into the Pharmaceutical Care and Dispensing Laboratory course. Students' self-perception of preparedness to apply PPCP was assessed via a survey composed of questions related to PPCP skillsets. The pre-PPCP laboratory cohort (control group) took the survey after the completion of their experiential rotations. The PPCP laboratory cohort (intervention group) took the same survey prior to taking the course, at the end of the course and then following the completion of their IPPEs. The Pearson's and McNemar Chi-square tests were used for statistical analysis. **Results** The findings indicate that the PPCP based laboratory significantly improved students' perception of their preparedness to apply a standardized pharmacist care process to verify prescriptions, to collect relevant patient information, and to develop an individual patient-centered care plans. This significant impact of the PPCP based laboratory course on students' perception was maintained through the following year when assessed after IPPEs. **Conclusion** Introduction of the PPCP model within a dispensing laboratory course, prior to students' IPPEs, develops students' perception of preparedness. Incorporating PPCP via active learning and simulation narrows the gap between the didactic and experiential curriculum by establishing a bridge between understanding the concept of PPCP and readiness for applying it in practice experiences.

Background

Pharmacists have become essential members of the healthcare team and are now responsible for the provision of a wide array of clinically oriented patient care services in various settings. In 2014, the Joint Commission of Pharmacy Practitioners (JCPP) approved a practice-based process, the Pharmacist's Patient Care Process (PPCP) [1]. This process aims to optimize patient health outcomes by equipping pharmacists with a practice framework to adopt when providing services in any multidisciplinary setting. The PPCP includes five continuous steps in providing patient care: data collection, assessment, patient-centered treatment plan development, treatment plan implementation through interprofessional collaboration, and outcome assessment and follow up [2]. The integration of this comprehensive process aims to promote consistency, predictability and measurability in pharmacists' daily practice, and further establish the role of the pharmacist within the health care team [1,3].

The American Association of Colleges of Pharmacy (AACP) Professional Affairs Standing Committee supports the PPCP application in pharmacy practice and education through policy statement 3 proposed in their 2014-2015 report: "Administrators, faculty members, preceptors and student pharmacists at all colleges and schools of pharmacy share responsibility for stimulating change in pharmacy practice consistent with the JCPP Vision for Pharmacy Practice and the Pharmacists' Patient Care Process" [4]. Moreover, the Center for the Advancement of Pharmacy Education 2013 educational outcomes together

with the PPCP model, form the basis of the Entrustable Professional Activities (EPAs) that have been recently described by the AACP. These EPAs aim to translate the Accreditation Council for Pharmacy Education (ACPE) 2016 Standards for the Doctor in Pharmacy degree and competency statements into practice, and have been suggested as a means to assess students' performance across the advanced pharmacy practice experience curriculum. Furthermore, ACPE standard 10, specifies the need to prepare students to provide patient-centered collaborative care through both the didactic and experiential pharmacy curriculum [3,5].

To address these standards and improve students' confidence and preparation for practice rotations, the Lebanese American University School of Pharmacy, which offers the only ACPE-accredited Doctor of Pharmacy program outside of the United States, integrated the PPCP model into its curriculum where students could learn how to apply the PPCP. To integrate the PPCP-related learning objectives throughout the curriculum, the faculty followed an approach that was used successfully in the past for biomedical components of the curriculum [6]. The Pharmaceutical Care and Dispensing Laboratory course, which is offered during the second professional year (P2) was redesigned to incorporate active learning and simulation into the skills laboratory to engage students, boost their learning satisfaction and allow them to increase their confidence in the application of all PPCP steps. The redesign also focused on teaching essential communication skills, both verbal and written, needed to be a competent and confident pharmacist [7]. The course was previously structured with a main focus on practicing counseling, weekly quizzes about medication information (ie top 200 drugs) and identifying prescription discrepancies with minimal active learning and emphasis on communication, collaboration and documentation, which have been recognized as the foundational elements of PPCP [7]. The selected laboratory course captures students as they complete their pharmacotherapeutics course series yet before they begin introductory pharmacy practice experiences (IPPEs). Therefore, faculty perceived that integrating the PPCP model into the course would be an opportunity to prepare students to acquire related skills as they progress in their professional years from didactic to experiential courses. Rivkin and colleagues reported that the introduction of the PPCP model improved students' ability to identify actual and potential medication-related problems in IPPEs within the community when compared to a historic control and that introducing PPCP early in the curriculum would help students learn and adopt PPCP concepts [8].

Gonyeau and colleagues also reported on the PPCP integration from a faculty perspective highlighting the need for faculty development in order to ensure appropriate introduction, reinforcement and assessment of PPCP throughout the curriculum [9]. Moreover, some schools of pharmacy decided to introduce the PPCP model into the curriculum starting the first day of the program in order to increase familiarity with the PPCP process [10].

In order to assess curricular changes holistically, it has been recommended to evaluate the effect of both student learning gains and student perception of their experience [11]. Moreover, improving students' confidence and perception of preparedness for patient care activities has been a useful method to prepare students for experiential rotations, as demonstrated by course assessment evaluations [12]. To our knowledge, data on students' perceptions of the curricular integration of PPCP and its effects on their readiness for experiential rotations has not been reported. The aim of this study is to assess the impact

of the newly introduced PPCP based laboratory course on students' perception of their preparedness to apply PPCP steps in introductory experiential rotations in their third professional year.

Methods

Pharmacy students enrolled in a Pharmaceutical Care and Dispensing laboratory course were included in this study. A control group enrolled in the course delivered in spring 2016, before it was revised, and an intervention group enrolled in the revised course in spring 2017. In both groups, the course spanned the spring semester of the second professional pharmacy year. In this two-credit course, which consisted of eleven three-hour sessions comprising 12 students per session, students were taught how to accurately interpret and fill prescriptions, analyze patient cases and safely dispense prescription and over the counter medicinal products and effectively communicate with patients and other healthcare professionals in both the in-hospital and community settings.

In this panel study, a survey was developed and administered to the control and intervention groups. The intervention group received the survey at three time-periods, prior to taking the course (time one, T1), at the end of the course (time two, T2), and then following the completion of their experiential training course (time three, T3). The control group received the same survey administered to the intervention group at T3, following the completion of their experiential training course, to facilitate an intergroup comparison with the intervention cohort.

The survey was paper and pencil based and composed of questions addressing the preparedness of students to perform the PPCP related skillsets (collect, assess, plan, implement, and follow up) (figure 1). The survey adopted a four point Likert scale (yes definitely, yes sometimes/somehow, no not much, no not at all) and was estimated to require about five minutes to be completed by students. The purpose of the survey was to assess students' perception regarding their preparedness to apply the PPCP related skillsets during introductory experiential education rotations during P3. Figure 1 represents mapping of the survey questions to each of the PPCP steps 'collect, assess, plan, implement, follow up. The first question addressed students' perception on the PPCP in general, followed by specific questions directly linked to each component of the PPCP. For instance, the question "the laboratory prepared me to collect relevant patient information from the prescription and patient profile in order to understand the patient's clinical status" is a direct mapping of the first step of PPCP on 'collect'. Also, the two questions 'the laboratory prepared me to implement the care plan in collaboration with other healthcare professionals', and then 'to tactfully counsel a patient', are directly mapped to the forth step of PPCP on 'implement'. In the control group, the survey was completed with answers provided anonymously. In the intervention group, students included their identification numbers in order to match the surveys for a before and after assessment.

The revised course was offered for the first time. It differed from the original course in its higher degree of active learning, simulation, and its focus on critical thinking, communication and interdisciplinary practice. Several pharmacy practice laboratory activities which have been shown to boost student

engagement, learning and confidence were implemented [7]. This course was facilitated by three faculty members from the department of Pharmacy Practice and two teaching assistants who all contributed to the preparation of the course content and delivery.

The first laboratory session consisted of a didactic lecture which explained how to apply the PPCP model while carrying out the different activities within the dispensing and pharmaceutical care process using the provided course material and documents. These included simulated paper-based physician order forms or prescriptions, patient profiles, a PPCP worksheet and medication errors reporting form. A worksheet was developed to reflect the PPCP systematic approach to patient care and the medication error reporting form used is an amended version of a previous published form [13,14]. Students were asked to collect necessary patient information in order to initiate appropriate medication screening, and to perform a pharmacotherapeutic assessment to resolve medication related problems prior to drug dispensing. Students were expected to complete and submit the PPCP worksheet by the end of each laboratory session.

During the subsequent laboratory sessions, students were divided into four groups, each composed of three to four students working as a team of pharmacists within a simulated pharmacy setting. Each student had a set of predefined activities to perform every week. All students had the opportunity to rotate and practice the different activities as per a predefined schedule throughout the semester. These consisted of 1) prescription screening, identification and resolution of medication related problems and order entry into the medication profile, 2) prescription filling and labeling, 3) identifying alternative drug availability on the market or in the institution, 4) checking a filled prescription, 5) answering drug information questions in response to patients or other health care professionals, 6) providing patient education and counseling, and 7) writing and communicating an SBAR (Situation, Background, Assessment, Recommendation) note. The activities were selected to reflect the different PPCP model steps. All students used computers to access the internet/library databases and other resources. Various active learning strategies and simulation were adopted to enrich the course delivery and enhance students' learning of the PPCP model. The adopted strategies included "Case Studies", "Student Presentations" and "Role Play" and Minutes Writes". "Minutes Writes" was applied by embedding open-ended drug information questions raised by nurses, physicians or patients within the laboratory patient cases [3,15]. Students were then given a few minutes to perform their research and write down their answers. In "Case studies", student groups were provided with a medication profile including patient specific information, a prescription or a set of physician orders, and were instructed to identify potential medication errors through data collection, literature evaluation and critical assessment of pharmacotherapy. After identifying medication related problems, students performed "Student Presentations" by writing and presenting a brief SBAR (Situation, Background, Assessment, Recommendation) note addressed to another healthcare professional (ie nurse, physician). Finally, "Role Play" was applied whereby students were given the opportunity to practice their interprofessional communication and patient counseling skills within a situational context. Finally, faculty assigned one student in each group to perform a self-evaluation of the group's performance using a PPCP based evaluation form. The study was approved by the Lebanese American University (LAU) Institutional Review

Board (IRB).

Statistical analyses were performed using SPSS version 25 software. Answers on the four points Likert scale were regrouped into binary response levels. Then results were summarized using frequencies and percentages. Differences in proportions of students agreeing to a certain statements between the different groups were tested using the Pearson's chi-square when the groups were independent, and the McNemar Chi-square when the groups were dependent. All analyses were carried out at the 0.05 significance level.

Results

The surveys were administered to a total of 67 and 70 students in the intervention and control group, respectively. The response rate in the intervention group was 60 (87.1%), 61(91%) and 61(91%) at start of PPCP Laboratory (T1), at end of PPCP Laboratory (T2), and after completing the introductory experiential course (T3), respectively. In the intervention group, there were 43 out of 61 students (64%) with matched completed surveys for analysis. The response rate was 54 (77%) for the control group.

Table 1 reveals the significant impact of the newly introduced PPCP-based laboratory course across the seven PPCP-related skillsets ($P<0.001$) before and after the course completion for the intervention group. This significant impact of the PPCP based laboratory course on students' perception was maintained through the following year when assessed after IPPE training course ($P<0.001$).

Table 2 compares the students' perception between the two student cohorts, on their preparedness to apply the PPCP related skillsets after completing their IPPEs. The findings indicate that the PPCP based laboratory course significantly improved students' perceptions of their preparedness to apply a standardized pharmacist care process to verify a prescription (88.3% vs 98.4%, $p=0.032$), to collect relevant patient information (90% vs 100%, $p=0.013$) and to develop an individual patient-centered care plan (82.8 vs 95.1%, $p=0.031$).

Discussion

The Pharmacy Care Skills Laboratory course was redesigned to improve students' comfort and confidence performing PPCP related skills to prepare them for experiential education. Based on the survey findings, the PPCP cohort students reported being more confident applying the PPCP in their first exposure in the real life setting, during IPPEs, as compared to students in the control arm. Although students seemed more prepared to apply PPCP related skillsets, this was not consistent across all skillsets. For the PPCP elements that needed more simulation of real life practice such as monitoring a patient care plan (89.5% vs 98.4%, $p=0.055$) and implementation of the care plan (84.5% vs 90.2%, $p=0.351$), the improvement did not reach statistical significance in students' perception. This was expected since improvement and confidence in these skillsets are acquired during real life interdisciplinary practice. Future development of the laboratory to have a component of interprofessional education would potentially improve students' confidence in the PPCP implementation step. Planning for interprofessional education is essential for student pharmacists since patient care is incomplete without

interprofessional collaboration [16]. Similar to our findings, others also showed that simulation activities successfully improved PPCP skill sets related to collecting information. In our study, there was no difference noted in counseling skills, which could be explained by the fact that the old laboratory structure was mainly focused on counseling. In comparison to the studies published by Rivikin and Gonyeau, our study reported an indirect assessment of students' self-perceptions of their confidence and retention of PPCP concepts from P2 laboratory to P3 IPPEs [8,9]. Consistent with other studies, the practice-based course provided students with the opportunity to apply the standardized PPCP in community and hospital settings [10].

Furthermore, spending time on developing student's critical-thinking and teaching them to think like pharmacists may be the most beneficial way to use class time and teach PPCP [8,17]. During the redesigned laboratory, students were encouraged to be as interactive as possible and given constant formative feedback to approach patient care in a systematic way. This practice-based laboratory fostered a safe environment to guide students through a stepwise approach to formulating assessments and communicating patient care recommendations. Faculty reminded students that detecting a medication related problem and formulating a plan were not enough without sharpening their skillsets for implementing a plan and following up on it.

While Subjective, Objective, Assessment, Plan (SOAP) notes have been used to relate to the PPCP steps [15]. We opted to use the SBAR approach instead, to encourage students to be succinct when communicating in an interdisciplinary setting [10,18]. Using SBAR to practice communications with standardized colleague simulations in both inpatient and outpatient settings showed to improve students' perception of their confidence in interprofessional communication performance [19]. As students learn the new model and sharpen their communication skillset, the chance for errors during implementation of their patient care plans is minimized [14,20]. Although students gain confidence and competence in applying the PPCP model during experiential rotations, introducing the model via simulation activities helps students learn how to apply it [21]. The strengths of this study show that low cost solutions, such as paper based simulation activities and faculty simulations have the potential to improve active learning in laboratory courses as an effective method to introduce PPCP skillsets. The findings of our study are consistent with literature published in medical students' education showing that students improve their self-confidence, knowledge and skills when they practice in a simulated environment using a learner-centered approach [14,15,20,22]. Furthermore, the study highlights that introducing PPCP via active learning and simulation based teaching not only improves students' PPCP confidence directly after concluding the course but also that students expressed that they were more prepared for experiential training. Incorporating this change allowed students to practice the application of PPCP during their second professional year prior to IPPEs. The authors concur with previously published literature that states that introducing PPCP and guiding students to practice on performing the EPAs is our responsibility as educators [23]. The advantage of such a laboratory at an introductory level is that students were given feedback on how to perform PPCP. Faculty feedback to improve students' skillsets during the laboratory should positively impact practice [23].

This study has a few limitations to note. Faculty delivering the course were not assessed for their confidence in PPCP. Evaluating faculty confidence and competence in PPCP may provide a framework to improve the teaching of PPCP to student pharmacists [24]. Although the faculty developed class material to guide through the steps of PPCP, they did not utilize EPA terminology to serve as objective outcome measures to evaluate confidence & competence in PPCP. Moreover, this study only relied on student perceptions rather than learning outcome assessments. Finally, incorporating interprofessional education into this course could have facilitated the introduction of PPCP steps.

Conclusions

The results of our study show that the PPCP-based laboratory structure helped increase students' confidence in PPCP steps and preparation for IPPEs. Further research is needed to assess if improving students' confidence is correlated with improving competence for IPPEs readiness. Moreover, improving and supporting faculty competence in teaching PPCP may also affect students' ability to perform PPCP in experiential rotations and eventually in practice as new graduates.

List Of Abbreviations

ACPE: Accreditation Council for Pharmacy Education

PPCP: Pharmacist Patient Care Process

JCPP: Joint Commission of Pharmacy Practitioners

AACP: American Association of Colleges of Pharmacy

EPAs: Entrustable Professional Activities

P2: Second professional year; P3: Third professional year

IPPE: Introductory Pharmacy Practice Experience

SBAR: Situation, Background, Assessment, Recommendation

LAU: Lebanese American University

IRB: Institutional Review Board

SOAP: Subjective, Objective, Assessment, Plan

Declarations

Ethics Approval and Consent to Participate:

The study was approved by the Lebanese American University (LAU) Institutional Review Board (IRB), approval number LAU.SOP.NC2.9/May/2017. Verbal consent was obtained given that participants acceptance to complete the survey was considered as a formal consent. Data was obtained from study participants with the disclosure that the responses to all questions would be treated in strict confidential manner and responses would be anonymous.

Consent for publication:

Not applicable

Availability of data and material:

The data that support the findings of this study are available from the corresponding author.

Completing interests:

The authors declare that they have no competing interests.

Funding:

No external funding was obtained for the study.

Authors' contributions

N.C, S.N, and YK were involved in the conception and design. NC and YK were involved in the data collection. N.C, SN, HD were involved in the analysis and interpretation of the data. N.C, SN, and YK drafted the manuscript. All authors have approved the final draft submitted and agree to be accountable for all aspects of the work.

Acknowledgements:

The authors thank Professor Nancy Hoffart for her review of the manuscript, and the pharmacy student Rasha Abou Ali for assisting in data entry in SPSS software.

References

1. American Pharmacist Association. Pharmacists' patient care process. <https://www.pharmacist.com/sites/default/files/files/PatientCareProcess.pdf>. 2014. Accessed April 20 2018
2. Bennett MS, Kliethermes MA. How to implement the pharmacists' patient care process. American Pharmacists Association Washington, DC; 2015.
3. Gleason BL, Peeters MJ, Resman-Targoff BH, et al. An active-learning strategies primer for achieving ability-based educational outcomes. *Am J Pharm Educ*. 2011;75(9):186. doi: 10.5688/ajpe759186
4. Taylor CT, Adams AJ, Albert EL, et al. Report of the 2014-2015 professional affairs standing committee: Producing practice-ready pharmacy graduates in an era of value-based health care. *Am J Pharm Educ*. 2015;79(8):S12. doi: 10.5688/ajpe798S12
5. Education A. No

title. Accreditation Standards and Key Elements for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree. 2015. 6. Nasser SC, Saad AH, Karaoui LR. Mapping of the biomedical literature evaluation competencies based on pharmacy students' feedback. BMC medical education. 2016;16(1):59. doi: 10.1186/s12909-016-0583-7 7. Bellottiea DG, Kirwinb J, Allenc AR, et al. Suggested pharmacy practice laboratory activities to align with pre-APPE domains in the Doctor of Pharmacy curriculum. Curr Pharm Teach Learn. 2018;10(9):1303-1320. doi: 10.1016/j.cptl.2018.06.001 8. Rivkin A. Thinking clinically from the beginning: Early introduction of the pharmacists' patient care process. Am J Pharm Educ. 2016;80(10):164. doi: 10.5688/ajpe8010164 9. Gonyeau MJ, DiVall M, Conley MP, Lancaster J. Integration of the pharmacists' patient care process (PPCP) into a comprehensive disease management course series. Am J Pharm Educ. 2018;82(6):6311. doi: 10.5688/ajpe6311 10. Cooley J, Lee J. Implementing the pharmacists' patient care process at a public pharmacy school. Am J Pharm Educ. 2018;82(2):6301. doi: 10.5688/ajpe6301 11. Shaw TJ, Yang S, Nash TR, Pigg RM, Grim JM. Knowing is half the battle: Assessments of both student perception and performance are necessary to successfully evaluate curricular transformation. PLoS ONE. 2019;14(1):e0210030. doi:10.1371/journal.pone.0210030 12. Kirwin JL, DiVall MV, Guerra C, Brown T. Instructional design and assessment: A Simulated Hospital Pharmacy Module Using an Electronic Medical Record in a Pharmaceutical Care Skills Laboratory Course. Am J Pharm Educ. 2013;77(3). doi: 10.5688/ajpe77362 13. Chamoun NR, Zeenny R, Mansour H. Impact of clinical pharmacy interventions on medication error nodes. Int J Clin Pharm. 2016;38(6):1436-1444. doi:10.1007/s11096-016-0384-4 14. Kiersma ME, Darbshire PL, Plake KS, Oswald C, Walters BM. Laboratory session to improve first-year pharmacy students' knowledge and confidence concerning the prevention of medication errors. Am J Pharm Educ. 2009;73(6):99. doi: 10.5688/aj730699 15. Frenzel JE. Using electronic medical records to teach patient-centered care. Am J Pharm Educ. 2010;74(4):71. doi: 10.5688/aj740471 16. Murphy JE, Liles AM, Bingham AL, et al. Interprofessional education: Principles and application. an update from the american college of clinical pharmacy. J Am Coll Clin Pharm. 2018;1(1):e17-e28. doi: 10.1002/jac5.1025 17. Howard ML, Gaviola ML. Progressive disclosure cases: The design and evaluation of use in multiple therapeutics courses. Curr Pharm Teach Learn. 2018;10(6):723-729. doi: 10.1016/j.cptl.2018.03.001. 18. Kostoff M, Burkhardt C, Winter A, Shrader S. An interprofessional simulation using the SBAR communication tool. Am J Pharm Educ. 2016;80(9):157. doi: 10.5688/ajpe809157 19. Shrader S, Dunn B, Blake E, Phillips C. Incorporating standardized colleague simulations in a clinical assessment course and evaluating the impact on interprofessional communication. Am J Pharm Educ. 2015;79(4):57. doi:10.5688/ajpe79457 20. Atayee RS, Awdishu L, Namba J. Using simulation to improve first-year pharmacy students' ability to identify medication errors involving the top 100 prescription medications. Am J Pharm Educ. 2016;80(5):86. doi: 10.5688/ajpe80586 21. Skelley JW, Wulz JL, Thibodeaux AM. Implementation of an electronic medical record simulation activity aligned with the pharmacist patient care process in an ambulatory care elective course. Pharmacy Education. 2018;18. 22. Toy S, McKay RS, Walker JL, Johnson S, Arnett JL. Using learner-centered, simulation-based training to improve medical students' procedural skills. J Med Edu Curric Dev. 2017;4. doi: 10.1177/2382120516684829 23. Pittenger AL, Copeland DA, Lacroix MM, et al. Report of the 2016-17 academic affairs standing committee: Entrustable professional activities implementation roadmap. Am J Pharm Educ. 2017;81(5):S4. doi:10.5688/ajpe815S4 24. Vos Chair SS,

Brown MM, Cardello EA, et al. The report of the 2017-2018 professional affairs standing committee: The development of the preceptor self-assessment tool for entrustable professional activities for new graduates. *Am J Pharm Educ.* 2018;82(7):7162. doi: 10.5688/ajpe7162

Tables

Due to technical limitations, tables 1 and 2 are only available as a download in the supplemental files section.

Figures

Figure 1

Pharmacist's Patient Care Process (PPCP)

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Tables1and2.pdf](#)