

Adaptation of practical classes of clinical subjects in the COVID-19 era

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Pharmaceutical Care is a subject within the Pharmacy Degree that is taught using theoretical and practical classes. When COVID-19 appeared, Faculty of Pharmacy had to change its way of teaching and learning to online classes. Our aim is to assess the impact of COVID-19 situation on practical classes in Pharmaceutical Care. A prospective study was performed by undergraduate students from Pharmaceutical Care subject. Students attended to 2-day practical classes and were assessed through an evaluative workbook. Undergraduate students (n=390) obtained a score of 8.4±0.8 in practical classes, being higher in face-to-face sessions than online sessions, but not significant differences among both methodologies. The higher score was for the session of minor ailment services (9.3±1.3) and the lower for Personalized Medication Dosage (7.0±1.6) and similar in both scenarios. 59% of students obtained more than 8 score in the global punctuation, being higher in in-face-to-face practical classes. This study showed that learning in health care can be guided and evaluated through an online method. Adapt to new technologies, prevent vulnerable students from being left behind, as well as working on cross-cutting skills at a distance, are some of the challenges of higher education in times of COVID-19.

Keywords: Education. Pharmacy. COVID-19. Simulation. Pharmaceutical care. Online training.

INTRODUCTION

Through Pharmaceutical Care (PC), patients who need or use medicines and/or medical devices is the main focus of the pharmacist's activity. This ability to respond to patient needs with their medicines is the focus of Professional Pharmacy Services (PPS), whose development involves the active participation of the pharmacist in the improving the quality of life of the patient, through the dispensing of medicines, minor ailments, therapeutic adherence and medication review with follow-up, in order to optimize the use of medicines and improve health outcomes (Allemann *et al.*, 2014).

In Spain there are twenty-two faculties of Pharmacy. The European Higher Education Area (EHEA) has introduced changes in Spanish health education. These

gradual changes of teaching methodologies are focused on students' learning, being more practical and are a fundamental process for the adequate training of the future professional. Pharmaceutical education has undergone a radical change as it has evolved into a more patient-oriented profession, with the replacement of traditional classes-based formats with active-learning classes that promote higher cognitive learning, for instance, curricular practical classes facilitate the pharmacist's communication with the patient or health care professionals associated with PPS, more effective and applied to reality, which is hardly reflected in the theory (Awaisu, Mohamed, Al-Efan, 2007; Medina *et al.*, 2013). In this way, students were able to interact and apply the theoretical classroom to a real scenario. Simulation activities play a role in education of health care professionals and are a useful forum in which students can practice applying knowledge and skills without causing any risk or harm to the patient (Wilbur, Wilby, Pawluk, 2018). Although simulation activities cannot replicate authenticity, they do provide a

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means of familiarizing students with a new environment (Wilbur, Wilby, Pawluk, 2018), for example role plays with standardized or simulated patients (Lin *et al.*, 2011).

New teaching tools make it easier for students to have a training closer to the provision of PPS. Nevertheless, the new 2019 coronavirus disease pandemic (COVID-19) has disrupted pharmacy education worldwide, and most pharmacy schools have shifted from in-person to online classes (Pather *et al.*, 2020). They have had to adapt teaching-learning methodology as well as the evaluative methods with flexible approaches to achieve solutions (Li, Xv, Yan, 2020; Liang, Ooi, Wang, 2020; Rose, 2020) and combine resources to ensure continuity pharmaceutical education during this difficult time (Schneider, Council, 2020).

As a result of this situation at the University of Granada, Spain, the Rector's Office for the digital University, in coordination with the Monitoring and Coordinating Committee responsible for monitoring the current epidemiological situation triggered by COVID-19, adopted a series of measures to ensure the continued operation of services at the University, during the duration of this exceptional period: facilitate adaptation to remote off-site teaching environments, provide the necessary resources to support online and virtual remote teaching and achieve the most appropriate means to provide continuous academic service teaching, which includes theoretical and practical classes, tutorials and evaluations (Parsh, Gardner 2016).

The aim of this study is to assess the impact of the COVID-19 situation on practical classes in PC in Pharmacy Degree as an example of a health care related subject.

MATERIAL AND METHODS

Design of the study

A prospective study was conducted during 2019-2020 academic year that consisted of six hours spread over two days of practical classes. The practical classes were conducted in two situations, in face-to-face practical classes between February and mid-March 2020 (before COVID-19 situation), and online practical classes from second half of March to May 2020 (during COVID-19 situation).

Participants and setting

The study was conducted at the Faculty of Pharmacy at a University of Granada, Spain. Every student who had been enrolled to classes in PC of the Faculty of Pharmacy was eligible for inclusion in the study, since practical classes are mandatory in Pharmacy Degree. The subject of PC enables students to study about PPS and the role of the pharmacist in the improvement of pharmaceutical care.

The assignment of the groups was random.

The calculated sample size was 390, with 95% confidence level, taking into account that all students must take the practical classes.

Two groups were included in the study: one group that conducted face-to-face practical classes (evaluated before COVID-19) and another group that conducted online practical classes (evaluated during COVID-19) both from PC classes. They were evaluated by 3 evaluators, each one of whom was in charge of the same part before and during COVID-19.

In a normal situation, students would have attended practical classes in groups during the same period of time. The only difference with the pandemic was the virtuality.

Design of in face-to-face practical classes

The students practiced three different PPS (dispensation, minor ailments and therapeutic adherence), and included several tools such as: blood pressure measurement, cardiovascular risk analysis, Ambulatory Blood Pressure Monitoring (ABPM), dispensing record analysis and Personalized Medication Dosage (PMD) performance. All the sessions reported the same clinic case of a simulated patient, a 63-years woman with several drugs prescribed and allergic to penicillin who went to the pharmacy. The six different scenarios were:

1. First, the session on analyzing dispensing records focused on correctly interpreting the patient's different medical prescriptions, both on paper and electronic records. Students should 1) obtain information related to the medications dispensed,

- and 2) indicate possible interactions, storage conditions, preventive cancellation or referral to physician actions.
2. The dispensing session then consisted of an interview with the patient who wants to withdraw all of her prescribed medications. Students were required to complete: 1) The difference between the first dispensing of treatment and medication refill, 2) The relevant information assessed from the first medication, 3) The effectiveness and safety of the chronic treatment.
 3. As a result of unintentional non-adherence detected, the medication adherence session was initiated with the offer to the patient of the need for a PMD. The students had to perform a PMD with the medications prescribed to her.
 4. On another day, the minor ailment session was based on the patient who has diarrhea and she asks for something for her. The students had to answer: 1) Relevant information about the patient and the health problem, 2) Assessment of the minor ailment, by identifying if there are criteria for referral to a doctor, 3) Clinical interventions: lifestyle recommendations, pharmacological treatment, referral to a general practitioner or other professional pharmacy service.
 5. Likewise, the cardiovascular risk analysis session consisted of the patient presenting with headache and the pharmacist must measure blood pressure. The students had to calculate: 1) The weight grade (BMI: Body Mass Index) 2) Categorize hypertension 3) Calculated her SCORE (Systematic COronary Risk Evaluation) index.
 6. Finally, an ABPM was performed on the patient and a report was shown. Students must 1) analyze her ABPM record and 2) interpret the report that was sent to the doctor.

Students were randomly grouped into pairs to perform role-play related to dispensing and minor ailments services (scenarios 2 and 4). One student from each pair participated in a role-play with a simulated patient, while the other student acted as a pharmacist. The patient responded according to a predesigned script asked by the pharmacist, and if no response appeared,

the patient responded “I do not know”. Not asking for everything necessary will not lead to the correct final resolution of the case. At the end of the role play, the couple changed roles and the simulated case. This couple measured each other’s blood pressure (scenario 5). The analysis of the dispensing record, PMD performance, the analysis of ABPM record and SCORE index analyze, and ABPM report interpretation (scenarios 1, 3 and 6, respectively) were individual work.

To the evaluation, students were given 30 minutes to complete all of the practical class scenarios (dispensing record analysis, dispensing role-play, PMD performance, minor ailment role-play, cardiovascular risk analyze, and ABPM record analyze) and complete the workbook. The practical classes represent for 10% of the final grade of the course. The evaluation method is the final resolution of the case and to answer a series of questions (3 per scenario) in a workbook in relation to the communication skills, the information obtained and the method of recording. This workbook had the same questions and format of text and images for both groups.

Change of design of online practical classes

When COVID-19 situation started, the practical classes were designed and adapted to the circumstances agreed upon by a focus group composed of four experts (professors of the subject of pharmaceutical care and researchers in the field), but with the same scenarios, services and tools to consider how the students could develop and demonstrate skills, and were homogeneous to the students who did the face-to-face practical classes. Academic classes and curricular practical classes, all of them carried out through videoconferencing via the online teaching platform Google Meet. A schedule was made and messages were sent to students by email to join their respective classes. To make the session interactive, students were encouraged to use the chat-box and turn on their microphones, whenever feasible.

The changes implemented in the new online mode were: 1) role play was not possible but they had a written interview of the simulated patient in the workbook and they had to fill it with the questions to ask the patient and the final intervention; 2) it was not possible to perform

the blood pressure measurement manually, so these dates were provided for the calculation of the clinical parameters and 3) and PMD was studied through a document of elaboration and verification of the PMD which had to be completed in the workbook with what type of medication they could include in the simulation case. All of them difficult to compare with face-to-face classes, but with the evaluation being similar.

Qualitative opinions

Evaluators' and students' opinions were collected as additional comments in a questionnaire by email to obtain extra information.

Statistical Analysis

Data were analyzed by calculating means and standard deviations or median, according to a normal distribution or not, respectively, for numerical variables, and frequencies were used for the qualitative ones. Statistical comparisons were made using independent t tests for unpaired observations. Values of $p < 0.05$ were considered significant. The analyses were performed using SPSS software for windows, version 19.0 (IBM Corporation, Armonk, NY, USA).

RESULTS

390 students from the Faculty of Pharmacy of the University of Granada were included in the study (n=112 students attending face-to-face practical classes (before COVID-19) and n=278 online practical classes (during COVID-19)). Only 4 students did not show up (1%). Approximately 72% were women and more than 85% Spanish students from both groups (Table I). No differences were found in the demographics data and the questionnaire items between both groups. There were some significant differences when comparing the global score between women and men. Women scored higher

than men (8.2 ± 1.0 vs 8.0 ± 0.92 ; $p = 0.030$). Significant differences were shown when scores were compared between Spanish and non-Spanish students (8.2 ± 1.0 vs 7.8 ± 1.0 ; $p = 0.019$).

The global score was 8.4 ± 0.8 out of 10. The higher score was in the minor ailment session (9.3 ± 1.3) and the lowest was in the PMD session (7.0 ± 1.6) (Table II). No significant differences were found in the global score among the students who attended the practical classes before and during COVID-19 (8.5 ± 0.8 vs 8.3 ± 0.7 , $p = 0.59$). Moreover, no one failed the practical classes and 59.0% obtained a score above 8 in the global score. This proportion was lower in online practical classes than in face-to-face practical classes (64.3% before COVID-19 and 56.8% during COVID-19). ABMP before and after COVID-19 showed higher score before COVID-19, being statistically significant (8.1 ± 1.7 vs 7.8 ± 1.1 ; $p = 0.09$).

The students' participation in the online classes was significantly lower, since the lack of eye contact between teacher and students, as well as questions through the chatbox acted as a barrier in the communication. Finally, additional comments by a questionnaire on the online practical classes were that "Despite being online classes, they have been very useful and have given an idea of the world of pharmacy", "The practical classes had been dynamic and practical", "We appreciate the effort to adapt practical classes with face-to-face practical classes".

TABLE I - Demographics data

	Before COVID-19	During COVID-19	Overall
Total students n	112	278	390
Women n (%)	82 (73.2)	197 (70.9)	279 (71.5)
Age mean \pm SD	23.0 (3.6)	22.7 (3.2)	22.8 (3.4)
Spanish students n (%)	98 (87.5)	238 (85.6)	336 (86.2)

TABLE II - Difference between students' scores before COVID-19 and during COVID-19 (mean (SD))

	Before COVID-19	During COVID-19	Overall	p-value (before and during COVID-19)
Dispensing records analysis	8.8 (0.9)	8.7 (1.0)	8.8 (1.0)	0.33
Dispensing service	8.4 (1.8)	8.1 (1.2)	8.2 (1.3)	0.11
PMD	7.0 (1.6)	6.9 (1.6)	7.0 (1.6)	0.58
Minor ailment service	9.4 (1.4)	9.2 (1.2)	9.3 (1.3)	0.19
Cardiovascular risk	9.1 (1.4)	9.1 (1.3)	9.1 (1.3)	1
ABMP	8.1 (0.9)	7.8 (1.1)	8.0 (1.0)	0.09
Global	8.5 (0.8)	8.3 (0.7)	8.4 (0.8)	0.21

DISCUSSION

The International Pharmaceutical Federation (FIP) recommends preparing Pharmacy graduates to develop clinical and communication skills to provide effective PPS (Manikkath *et al.*, 2020). At the Faculty of Pharmacy in Granada, PC is a course that was an elective; however last year it has become compulsory subject, due to the importance of the pharmacist's role in providing care.

The teaching community expresses great concern about the lack of real translation between training and practice in PPS with the acquisition of specific knowledge, skills and attitudes (Block *et al.*, 2013).

In the active learning classes, for instance practical classes, the students are more involved in the learning processes that lead to a better analysis, synthesis, and evaluation of the subject, PC in our case (Dong, Goh, 2015). However, in a study from Australia no significant differences in the academic performance between face-to-face and online learning classes were found (Kemp, Grieve, 2014). Role play and simulation are both experiential learning methods that incorporate the creation of a scenario in which skills can be rehearsed, in which students themselves must assume different roles (for example a patient and a pharmacist) (Brennan, 2002). Role-play techniques when used as an assessment tool have been postulated as a way to achieve a more natural and life-like conversation, because they disrupt the usual power imbalances between the evaluated and

the evaluator, though this will depend on the context. Role play has been evaluated in the training of medical (King, Hill, Gleason, 2015; Xu *et al.*, 2016) and nursing students (Miles *et al.*, 2014), reporting an increase in empathy (King, Hill, Gleason, 2015, Xu *et al.*, 2016) an opportunity to practice communication skills in a safe and supportive environment; an opportunity to experience more unusual clinical scenarios; the value of peer feedback (Nestel, Tierney, 2007); and the opportunity to observe one's own body language and interaction (Miles *et al.*, 2014). However, there are questions about authenticity in reference to the acceptability or success on this approach with populations that are not student or other groups of health professionals (Kruijver *et al.*, 2001; Nestel, Tierney, 2007).

Some PPS require face-to-face attendance as evidenced by ABMP scores before and during COVID-19 (8.1±1.7 vs 7.8±1.1; p=0.09). COVID-19 had an impact on the health education of the trainees on how to deliver exceptional patient care and the quality of trainees' education (Rose, 2020; Theoret, Ming, 2020). Face-to-face classes are known to facilitate critical thinking and a sense of community (Luo, Kalman, 2018). In fact, in our study, students who attended face-to-face classes scored higher than online classes and ABMP was higher statistically significant. However, most educational institutions have implemented video-learning platforms (Murdock *et al.*, 2020) or other digital methods in Pharmaceutical Care (Arnet *et al.*, 2020) during COVID-19 era. Our findings

show that although students scored higher in the face-to-face classes, no significant differences were found with students who attended online classes (8.5 ± 0.8 vs 8.3 ± 0.7 , $p=0.59$; before and during COVID-19 respectively). According to our study, Master of Pharmacy students at an Australian university perceived virtual programs as valuable and relevant to their future careers and may interact with them in their real-world locations (Lucas, Williams, Bajorek, 2019).

In line with a study about Pharmacy students (Shawaqfeh *et al.*, 2020), the positive attitude towards online classes is shown by students' comments as follows: "Despite being online classes, they have been very useful and have given an idea of the world of pharmacy", "The practical classes had been dynamic and practical", "We appreciate the effort to adapt practical classes with face-to-face practical classes".

Some limitations in the study were that during COVID-19, the evaluators noticed that on the first day of practical classes (Dispensing record analysis, dispensing service and PMD sessions) students had less doubts than on the second day (minor ailment service, cardiovascular risk and ABMP sessions), maybe due to they did not understand what was the same case on both days Another problem was that some students had internet connection problems so they lost part of the teachers' explanation and had difficulty following the instructions.

CONCLUSION

This study showed that learning in health care can be guided and evaluated through an online method. Despite the situation, similar results have been obtained to those of the face-to-face classes in order to continue online scenario during the following academic year. Adapting to new technologies as well as working on transversal skills at a distance are some of the challenges of higher education in the times of COVID-19.

DECLARATION OF INTEREST

All authors report no conflicts of interest. The study has no funded.

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