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Research Article

Involvement of Pharmacy Students in a Campaign on Rational Drug Use: A Brazilian Experience of Active Learning

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ABSTRACT

The rational drug use refers to the correct use of the correct medication, which is obtained from a trustable source and with health assistance. The aim of this study was to describe an experience of active learning by the construction of a public campaign on rational drug use that involved undergraduate pharmacy students and to evaluate the students' satisfaction and perceptions. The activity started with the creation of an educational flyer using a collaborative online platform. Then, a dramatization session took place before the students' participation in a public outreach campaign on rational drug use. Written feedback from the students, collected by an open question, evaluated their satisfaction and general perceptions regarding the activities. After evaluating clinical cases, raising key-points on the acquisition, administration, storage and disposal of drugs, creating the flyer and performing a training session, the campaign on rational drug use was successfully performed. Most of the students (96.67%) were satisfied with the active learning activities. The students reported being more aware of their role in their collective learning as well as having their communication, critical thinking and writing skills improved. The campaign itself and the related activities showed the importance of active learning methodologies in pharmacy education.

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Introduction

The rational drug use refers to the use of the correct medication in the correct dose and at the correct time of the day, being such medication obtained from a trustable source and with pharmaceutical or medical assistance [1]. It requires that "patients receive medicines appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and the community" [2]. The incorrect use of medications can cause a significant number of complications for users and it should be mentioned that medications are the main cause of poisoning in Brazil [3]. The improper use of drugs is mainly due to self-medication, which is defined as the use of drugs based on the will of the patient, without prescription. Self-medication is often associated with excessive drug use (dosage and/or duration as well as polypharmacy) [4].

The Brazilian government published laws concerning national health and pharmaceutical services programmes. Such policies affirm the importance of developing an educational process for both healthcare teams and the population in order to promote rational drug use. These strategies may include warning patients about self-medication risks, substitution or discontinuation of the use of medicine without professional health care guidance. These statements also emphasize the need for improving healthcare professionals' education and ensuring a quality public-health system [5, 6]. May 5th is considered as the national day of rational drug use in Brazil and, during such day, several campaigns take place throughout the country.

In Brazil, the pharmaceutical courses are regulated by a National Guideline for Undergraduate Education in Pharmacy that recommends a minimum of 4,000 hours of course structured in three axes: I - Health

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Care; II - Technology and Innovation in Health; III - Health Management. This National guideline emphasizes a humanistic, critical and reflexive education [7]. In this context, the development of communication skills is highly recommended [7, 8]. In the area of health sciences, doubts about the quality of the professional who is graduating are common. A traditional teaching may lead to a learning that is completely dissociated from the service and from the real needs of the health system [9]. It was pointed out by the American College of Clinical Pharmacy that Pharmacy students need to be more prepared for solving problems, for thinking critically, for acting ethically and self-directed and for well communicating [10]. Active learning represents engaging students in their learning process. In this way, the students take meaningful activities, while they should think about what they are doing.

A structured review published about the teaching of pharmaceutical care in Latin America reported the use of active teaching-learning methodologies in universities from Brazil, Costa Rica and Mexico. Brazil was the Latin American country with the highest evidence regarding the use of Information and Communication Technologies and simulation strategy in the pharmaceutical care teaching. It is emphasized the role of the active methodologies in the critical-reflexive process of learning and the importance to develop communication skills and to encourage an early contact of students with patients [11].

Based on the exposed, the aim of this study was to describe an experience of teaching and learning by the construction of a public campaign on rational drug use that involved undergraduate pharmacy students and to evaluate the students' satisfaction and perceptions after the activity. No similar experience was found in the literature so far. The few previous literature about educational campaigns on rational drug use are focused in the target public of the campaign. This paper, on the other hand, presents how the construction and execution of a health educational campaign could be used as a valuable active learning methodology for pharmacy students.

Methods

I Participants

This study described the steps and assessed students' satisfaction and perceptions after their involvement in a public campaign on rational drug use during the first semester of the pharmacy graduation course at Universidade Federal do Rio Grande do Sul, Brazil. The students (n = 60) were registered in "Introduction to Pharmaceutical Sciences" course between January and July of 2015, regularly attended classes, and authorized the publication of their anonymous data. The project was approved by the UFRGS Ethics Committee under the number 45051315.5.0000.5347. The students who did not participate in all the steps were excluded from the sample.

II Building the Knowledge by Problem-Based Learning

Problem-based learning was used to build the students' knowledge regarding the rational drug use. The professor prepared four hypothetical clinical cases involving different aspects of rational drug use: acquisition, administration, storage, and disposal of drugs (Table 1). The cases were intended to generate collaborative discussions among

students, allowing them to be the actors of their own learning, with the professor acting as a facilitator of this process. Throughout the clinical cases, the professor included misconceptions and problems commonly observed in the population. For each case, the students were asked to raise key-points, which were compiled in a document and made available to them after the class in order to be used as basis for the following step.

III Creating the Campaign Material

For creating the campaign material, the students were randomly divided into four groups. Each group was responsible for one of the rational drug use areas and searched for information, based on the key-points raised during clinical cases evaluation, for the creation of the flyer. An online-learning platform called Moodle was used for the construction of the campaign's material. During the course, free access to a collaborative hypertext file was available to all the students. This tool allowed students to edit the same text collaboratively in order to develop the educational material that was used in the public campaign. The students received instructions on the use of the collaborative writing platform and a five-week deadline was established to finish the collaborative text. After the deadline, the material constructed was discussed in the whole group in an attempt to improve the information's concision and clarity. The campaign flyer was prepared and printed by the UFRGS Publishing House.

IV Training by Dramatization Session

One day before the campaign, during class, a training session was held. Professional verbal and body language were discussed with the students. After, a dramatization methodology was used by the students to simulate interaction with patients. Each student played the role of the pharmacist or the patient and acted according to the assigned scenarios. The professor observed and provided students with feedback.

V Conduct of the Campaign

On the scheduled day of the campaign, during class period, the 60 students were supervised by 3 professors. In groups of two or three students, they interacted with the population throughout the city (in front of hospitals and health public clinics), providing information on rational drug use according to the training session and distributing copies of their educational flyer. For approaching the population, the students asked questions such as "Do you use medications?" and "Do you have doubts about the medications you use?". Based on the responses, students highlighted important information from the flyer to the population.

VI Evaluation of Student's Perceptions after the Campaign

The students provided written feedback about their satisfaction with the campaign and the related activities as well as about their general perceptions. The question answered by the students was "Are you satisfied with the rational drug use campaign and the related activities performed? Also, if you feel comfortable, please indicate your general perceptions about the activities." Regarding the degree of satisfaction, the number of negative and positive answers were counted and evaluated as percentage of the total number of answers. The general perceptions of the students are shown in the Results section.

Results

After evaluating the clinical cases mentioned (Table 1), the students raised important key-points on the rational drug use (Table 2), including issues about acquisition, administration, storage and disposal of medications. Those key-points were used as basis for the students to create the flyer information (Table 3). During the campaign for rational

drug use, the students distributed around 500 flyers and interacted with the population, trying to help them about their issues regarding their medications and health conditions. People of different gender, age and conditions were approached, without specific clinical and social features. This practice was the students' first professional experience, allowing them to act as future healthcare educators, as proposed by the National Curriculum Guidelines for degree course in Pharmacy [7].

Table 1: Clinical cases used by the students to raise key-points about rational drug use.

Cases	Description
Case 1	Mrs. Zilá, a 67-year-old woman, began feeling pain in her neck and head, dizziness, restlessness, and palpitations. She consulted a cardiologist and, after a series of tests, was diagnosed with hypertension. Two medications were prescribed to be taken in the morning on an empty stomach. Mrs. Zilá entered the first pharmacy that she saw after leaving the hospital and was startled by the price of the drugs. However, as the doctor had left her worried about the necessity of starting medication as soon as possible, she bought it and started the treatment. In the following days, she took the drugs only when she felt pain, and, as time passed, the symptoms gradually became worse. Because she thought that the treatment wasn't effective, she asked her neighbour, who is also hypertensive, for advice. The neighbour told Mrs. Zilá to double the dose of medication already prescribed by the doctor, and also indicated a third drug that he was using. Mrs. Zilá followed the neighbours' advice and did not feel better. On the contrary, she needed to return to the hospital with an even lower blood pressure.
Case 2	Karina is a businesswoman that travels for work very often and has had recurring headaches. But the medicine that she leaves in her car for emergencies had not been helping her, even though it was not expired. She switched, on her own, to another drug that promised similar results. At first, it worked well, but Karina starts presenting rashes on her skin, which intensified over time. The following week, she had difficulties breathing, and her husband took her to the emergency. There, she was treated and diagnosed with allergy/hypersensitivity symptoms, and, because of her medical history, the doctor supposed that the allergy started with the last drug introduced.
Case 3	Mariana is a teenager who just had her first urinary tract infection. She felt a lot of pain and went to the doctor for a diagnosis and consultation. After all the tests, the doctor prescribed two drugs and said that one was an antibiotic and another for urinary pain. She took the medications strictly as prescribed, but noted that her urine was different, orange-coloured, which worried her. As a precaution, she stopped using the drugs. Following the persistence of symptoms, she returned to consult the doctor, who ordered new tests to verify the possibility of bacterial resistance. This led to the development of a new treatment without interruption.
Case 4	Cesar, an economist, lives with his wife and son. He went to a drugstore to buy his insulin and found a promotion in anthelmintic drug: every three boxes bought, earned one more for free. He bought six boxes, leaving the drugstore with eight of them for his family and parents. At home, he, his wife, and his son took their doses. However, after the purchase, his parents reported that they were allergic to one of the excipients of the medicine. The drugs were only valid for two more months, which was probably the reason for the sale. Since the drugs would not be used, Cesar flushed the pills down the toilet to prevent their child or dog from accessing them. The packaging, bubble wrap, and leaflet were discarded into the non-recyclable waste.

Table 2: Key-points listed by the students for each evaluated clinical case.

Cases	Key-Points Listed
Case 1	<ul style="list-style-type: none"> - Self-medication following the advice of friends; - Financial difficulty in the acquisition of drugs or lack of information about places with more affordable prices or government programmes; - No advice about drugs access or communication between doctor and patient, - Lack of reinforcement in drug administration; - No communication with the pharmacist; - Lack of pharmacist-patient relationship; - Taking the medicine only when symptoms appear, and not as prescribed, creating difficulties in adhesion and efficacy of treatment; - Lack of a more human contact between patient and doctor; - Lack of clarity in prescription.
Case 2	<ul style="list-style-type: none"> - Incorrect storage of medications; - Self-medication: drug replacement without consulting a qualified professional; - The patient didn't read the patient information sheet/leaflet; - Patient didn't seek for professional help at the beginning of the problem, leading to more serious and unexpected adverse effects; - Lack of a channel or way of communication with health professionals; - Banalization of the symptoms and the medication used, not considering it seriously.
Case 3	<ul style="list-style-type: none"> - Lack of knowledge of the most common adverse effects, as they may occur even with treatment being followed correctly; - Lack of patient information sheet/leaflet reading; - Lack of precise orientation of health professionals;

Case 4	<ul style="list-style-type: none"> - Lack of medical orientation about the interruption of the treatment in the case of the occurrence of adverse effects; - Technician and mechanistic approach with the patient only in the sense of healing and not of prevention; - Lack of attention and care of the patient with antibiotics, ignoring or disregarding the risk of bacterial resistance. - Improper disposal: the depositing of drugs in the toilet is harmful to the environment and populations' health. - The entire packaging (that was disposed of) may illegally be reused for counterfeit drugs; - Promotion and advertising of drugs in pharmacies encouraging the culture of commercialization and trivialization of the drugs' use; - Unnecessary household stock of medicines; - The patient didn't check the expiration date of the drug at the time of purchase; - Suggesting and encouraging pharmacological treatments for relatives, without consultation from a healthcare professional; - Lack of information about the acquisition of drugs through government programmes; - Focus on sales and not on a holistic treatment for the patient; - Omission of the pharmacist's role and lack of recognition for this profession by the population.
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Table 3: Information created by the students for the flyer of the rational drug use campaign.

Subject	Information in the campaign folder
Acquisition of drugs	<ul style="list-style-type: none"> - Patients should avoid self-medication and buying medicines because they worked well for someone they know; - The drug availability in government pharmacies should be observed before acquisition; - Medicines should be purchased considering the real need of the patients, avoiding unnecessary household stock which will lead to disposal; - When purchasing a medication, the patients should always observe for the presence of the pharmacist at the drugstore.
Administration of drugs	<ul style="list-style-type: none"> - The administration of drugs should always be performed with monitoring by a healthcare professional; - Patients should respect the prescribed doses and not interrupt the treatment; - Before use, the medication should be evaluated regarding the expiration date and package conditions; - The patients should always mention to the healthcare professionals all the medications that they are using.
Storage of drugs	<ul style="list-style-type: none"> - Medications should be stored in their original package with the patient information sheet/leaflet; - The place for storage should be without sunlight, heat and humidity, far away from food and cleaning products and inaccessible to kids and pets.
Disposal of drugs	<ul style="list-style-type: none"> - Expired drugs shouldn't be thrown into sinks, toilets and common waste; - The incorrect disposal of medicines can cause water and soil contamination, besides causing risks to the population and animals; - Expired medicines should be taken to specialized collection points where they will be forwarded to the correct disposal.

Regarding students' satisfaction about the campaign and related activities, 96.67% of the students described being satisfied with the activities performed. Only 3.33% of the students were not satisfied. They justified their dissatisfaction based on the fact that they did not feel comfortable with the campaign itself, because they had to interact with people. About their general perceptions regarding the active learning

activities, the original statements are shown in (Table 4). Almost half of the students gave the professors a feedback about their perceptions. It can be seen that the students were able to realize the importance of the campaign as well as the previous activities performed for their learning as future pharmacists.

Table 4: Students general perceptions about the drug use campaign and related activities.

Different activities performed	Original statements (translated from Portuguese to English)
Building the knowledge and creating the flyer material	<ul style="list-style-type: none"> - "I was encouraged to develop my critical thinking skills during the cases evaluation." - "Participation and interaction with the professor and classmates stimulated reflection about the problems pointed out in the clinical cases." - "Many of the critical points discussed with the clinical cases are problems that usually go unnoticed. As future healthcare professionals, we will face the challenge of learning to identify these problems." - "The problem-based learning allowed us to contextualize the information – "practical theory" - and facilitated the choice of information to be subsequently placed in the flyer." - "The methodology used by the professors was important for a more complete understanding and to give us motivation to search for new information." - "By means of the activities performed, I could understand the importance of clear and objective writing of the flyer." - "It was our responsibility to provide correct information to people, therefore the activity was very valuable."

Training session before the campaign	<ul style="list-style-type: none"> - “My colleagues and I realized that cooperation and written communication skills are important for our education as qualified and exemplary pharmacists.” - “The use of the online collaborative platform allowed us to interact with each other and it was possible to do the activity when and where we preferred.” - “We were encouraged to seek additional information for our writing and to make it easy to understand for the general population by developing clear and objective language.” - “I already possessed the knowledge, but the methodology for the flyer creation helped to organize it.” - “This group activity highlighted the importance of working as a team and the importance of everyone in the group doing their best.” - “The training was very useful in preparing us for interacting with the public.” - “The training and communication tips contributed to raising my self-confidence.” - “I had difficulties related to shyness, but the training session helped me.” - “The reality of the campaign was different from the training session. This was probably because the training was held among the students, with familiar people with a known educational level, without the concerns that a real conversation would inspire. Even though, I appreciated the training step before the campaign.”
Conduct of the campaign	<ul style="list-style-type: none"> - “The knowledge and learning acquired from the campaign are worth more than being in a classroom.” - “We learned more in practicing our profession rather than in studying for tests on often inapplicable material.” - “As future healthcare professionals, the campaign was a way to encourage improvement of public speaking and communication strategies.” - “I have never had a previous experience of interaction with the public. Therefore, such activity was very important to me.” - “The public were, in general, very receptive to the information. This fact motivated us.” - “The campaign went above my expectations and I felt fulfilled afterwards, despite my hesitation before the activity.” - “Observing the doubts and the receptivity of the public during the campaign, we had the opportunity to practice healthcare education.”
General comments	<ul style="list-style-type: none"> - “Progress was observed during the semester. The campaign, however, combined all of the information and knowledge.” - “During the campaign and related activities performed, my colleague and I observed our own evolution.” - “My maturity developed during the activities proposed.” - “I could see the importance of active learning methodologies proposed by our professors.” - “In the beginning, some of my colleagues and I were not interested in the construction and implementation of the campaign, but, during the process and afterwards, we recognized its importance and considered it a rewarding experience, unlike our initial expectations.” - “The acquired knowledge from the campaign and related activities were very applicable to my pharmaceutical education.”

Discussion

Active learning methodologies are shifting students' passive learning to an active model, where the student is the actor of their own learning supported by the professor, who becomes a mediator and no longer the protagonist of academic learning. The adoption of active and innovative methodologies is a widely recognized strategy to stimulate students' proactivity throughout their acquisition of knowledge [9, 12, 13]. Active-learning techniques have been proposed in Pharmaceutical teaching, including patient simulation, discussion-based learning, problem-based learning, audience response system as well as participation in health campaigns [14, 15].

Almeida and co-workers (2014) discussed the importance of different active learning methodologies to enable patient-oriented clinical and humanistic training [16]. In this context, problem-based learning and simulation methodologies are emphasized. The dramatization is a type of simulated patient method. Mesquita and co-workers (2010) encourage the use of simulated patient methods as an educational tool [17]. This

approach can reduce the anxiety associated with communication and improve the communication between the future pharmacist and patients.

According to Jungnickel and co-workers (2009), the pharmacy curricula of the future should be based on highly interactive learning experiences [18]. The public campaign on rational drug use described in the present report can be considered a good example of an experience of high interaction from the students. The pharmacy graduation course must prepare the students in a humanistic, critical, reflexive and generalist way [7].

Araújo and co-workers (2019) analysed the Brazilian undergraduate pharmacy curriculum and identified gaps in the curricula concerning the teaching of communication skills. These authors also described the higher frequency of communication contents in the last years of the undergraduation courses [8]. These authors emphasized the importance of the development of communication skills since the beginning of the pharmacy course. In another study, Collier and Baker (2017) developed a health care communication course comprising simulations and active

learning designed for students in the first year of a pharmaceutical course [19].

In the present report, the involvement in a public a campaign on the rational drug use is proposed for first semester- pharmacy students. The campaign itself and the related activities (problem-based learning for building knowledge, creating the campaign material by an online platform, dramatization session) performed in the class contributed to the technical knowledge of the students. The feedbacks from students on the activities were very positive. The majority of the students were satisfied after performing the active learning activities. The students reported an improvement of their oral, written and critical thinking skills with the campaign and related activities.

The reports about the use of active learning methodologies in Brazilian pharmaceutical education are emerging. Mesquita and co-workers (2015) described an experience of active learning incorporation in a group of students from a Brazilian pharmaceutical care course [20]. The researchers employed different learning strategies: dialogic classroom expository, role play, simulated patient, lecture, case studies, virtual patient. The results included an improvement in the students' competencies and increased students' satisfaction with the learning process. More recently, Czepula and co-workers (2018) described the effects of an active methodology blending face learning and online education in a group of undergraduate students of Pharmacy [21]. Foppa and co-workers (2019) presented a Brazilian experience of clinical practice in a real workplace as an active learning activity centered in the pharmaceutical care [22]. However, we did not find any similar study concerning active learning experiences comprising the construction of health educational campaign in the pharmaceutical rational drugs use context.

The contribution of the activity to the society should be pointed out. The students demonstrated their abilities to contribute to the healthcare of the community, by participating in such activity, and were surprised to see their expectations overcome, since many had no previous experience of interaction with the public. The active methodologies were enriching in these students' education. The current literature focus on different drug use aspects. For example, a study carried in Brazil, showed that the storage conditions could affect the safety of medications [23]. Similarly, studies conducted in different countries aimed to evaluate medication use, storage and/or disposal among different population [24, 25]. Moreover, a study on the essential medications' utilization showed the need for improving the rational drug use in ten developing countries [26]. Eickhoff and co-workers described the need for a proper management of medication disposal, comparing programmes adopted in different countries [27]. The present investigation, on the other hand, presents how the construction and execution of a health educational campaign could be used as a valuable active learning methodology for pharmacy students in the rational drugs use context.

Although considered successful, specific limitations of the described activity are pointed out: i) The satisfaction of the benefited population was not evaluated; ii) The knowledge acquired by the students was not quantitatively evaluated; iii) To apply this study in different countries, local legislation about the use of medications must be considered.

Conclusion

The pharmacy students' involvement in the public campaign on rational drug use using active learning methodologies had a great impact on the students, presenting potential to improve oral, written and critical thinking skills, besides giving awareness of students' role as future health professionals.

Conflicts of Interest

None.

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