

Pharmacy Education in Brazil on the COVID-19 Pandemic: current state and perspectives.

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Abstract. Brazilian Pharmacy schools have been extensively adapting their course curricula in response to the latest national guidelines, published in 2017. However, the emergency of Coronavirus Disease 2019 has dramatically affected global education on several levels beyond the suspension of in-person classes, and the impacts promoted by this exceptional context are still unrevealing. This review aims to analyze the challenges and lessons for pharmaceutical education in the context of the COVID-19 pandemic in Brazil and to discuss how the current transformations in the profession, also impacted by the pandemic, might influence the students' development. Thus, a literature review was conducted on MEDLINE and Scopus databases. The few studies identified addressing this topic presented heterogeneous objectives and methods, but demonstrated varied initiatives to implement remote models and engage pharmacy students in this context. Different aspects of the educational process were addressed, evaluating parameters from mental health to the students' satisfaction with active learning methods tested. Generally, the authors registered positive perceptions of the proposed interventions during the pandemic but reported obstacles such as mental health issues, compromised development of practical skills, structural limitations, and aggravated discrepancies between public and private education. The experiences mentioned in this narrative review should help to reexamine pharmaceutical education, considering aspects such as virtual flexibility, development of computational skills, and reinforcement of evidence-based health care. In addition, fundamental transformations in the pharmacy labor market must certainly impact the educational background of pharmacists in a near future, including the advances in telehealth and clinical pharmacy attributions.

Keywords: pharmacy education, COVID-19, distance education, emergency remote learning, Brazilian education.

1. Introduction

Since the World Health Organization declared a global health emergency in 2020, the Coronavirus Disease 2019 (COVID-19) has caused dramatic changes in Brazil [1]. Besides the immeasurable losses regarding public health, educational institutions also have suffered severe impacts [2,3]. Universities were not allowed to minister in-person classes in the first moment of the pandemic, but private institutions quickly adapted to the remote model. In contrast, the lack of coordinated directions from the Ministry of Education has led to divergent answers from federal universities, which remained with suspended classes for a long period in 2020 [4]. Another barrier to the structural adaptation of public institutions was the significant

budget cut during this period, deepening disparities in education in general [5].

Especially for courses involving practical skills and health care, the transition to a remote-learning model was arduous. Completely remote undergraduate courses in the health sciences are not recommended in Brazil according to a resolutions of the National Health Council (CNS), although the regulation of this topic remains controversial [6]. In addition, for pharmacy students, the development of laboratory and clinical skills is essential, and in-person internships are mandatory during the education of these professionals [7].

The pandemic context has also affected the professional roles of pharmacists in different health

care settings. These professionals were involved in rapid implementations of virtual pharmaceutical services, the management of global drug shortages, an infodemic targeting the disease, and an unprecedented need to be updated with the most accurate scientific evidence out of thousands of articles published every day [8–10].

In face of such drastic adaptations both in the pharmaceutical services and in the educational background of future pharmacists, this study aims to address the main impacts of COVID-19 on the undergraduate Pharmacy courses in Brazil and to discuss future perspectives for the post-pandemic context. Although the influence of the pandemic on pharmaceutical education has been investigated by several authors framing the situation of other countries [11], no reviews were found analyzing the Brazilian setting until the moment of writing of this manuscript.

2. Methods

This study was conducted considering the recommendations of Ferrari (2015) for narrative reviews. Included studies were obtained from Scopus and MEDLINE/PubMed databases by March 16, 2022 [12]. Articles addressing pharmacy education in the context of the COVID-19 pandemic in Brazil were included after the analysis of the title and abstracts. The exclusion criteria were biological and or chemical approaches to COVID-19; education of other health care students; experiences outside Brazil. Additional sources were manually included to support the discussion and draw comparisons with the main findings.

3. The previous status of Pharmacy Education in Brazil

Before approaching the impacts of the COVID-19 pandemic on pharmaceutical education, it is pertinent to distinguish what transformations were already in progress in this field. With the advance of Comprehensive Medication Management (CMM) and other related pharmaceutical services directed to patient care in the different contexts of health, the philosophy of Pharmaceutical Care that was once called “a movement of counterculture” has been gradually turning into a guiding principle for pharmacy education [13,14]. As discussed by Ramalho de Oliveira [13], it was clear that, at some point, there would be a disturbance in the organization and power structures in Pharmacy schools to shift the former excessive focus on basic sciences toward the applied clinical sciences [13].

In Brazil, the curricular structure of pharmacy degrees must follow the National Curriculum Guidelines (DCNs), elaborated by the Ministry of Education. The most recent version of the document

was published in 2017 [7]. These guidelines reinforce a tendency to educate the pharmacist as a multidisciplinary professional but establish a prioritization of disciplines directly approaching health care to form professionals aligned to the Unified Health Care System (SUS). This is a critical initiative for an improved teaching-service-community integration, a challenge for pharmacists since the assembly of SUS [15].

Another important point of the 2017 resolution is the explicit mention of teaching pharmacies as mandatory scenarios of practice for the pharmaceutical services to all the students [7].

As numerous institutions are still managing to address these latest curricular guidelines, many changes in the next few years were already expected to happen regardless of the pandemic influence. Yet, issues on the education background of health care workers and in the health care systems during this public emergency should certainly modify the course of these modifications.

4. Virtual-Learning Challenges during the COVID-19 pandemic

There are very scarce sources addressing the aspects of pharmaceutical education specifically in the Brazilian background, and the available studies were not sufficiently wide-ranging to describe the complete scenario. The focus in this field seems to be on surveys to investigate the students' perceptions, but the participation rates were generally low [16–19].

In general, the aspects observed in the global systematic review conducted by Pires (2022) were also mentioned in the Brazilian context, with a tendency towards balanced impressions from the students [11]. Common challenges identified were pronounced difficulty in the studies, mental health disorders and psychological symptoms, reduced contact with teachers and classmates, unstable connection and problems with electronic devices, and the lack of practical lessons [11,16,17,19].

The first challenge for Brazilian students was the adaptation of higher education courses into the Emergency Remote Teaching (ERT) model, which happened heterogeneously during the first year of the pandemic, with a long period of total paralyzation of classes. After that, many public universities started inquiries to investigate the access of students and docents to technology to base the implementation of the new model [18]. The wait for academic activities to return after the initial suspension deepened the discrepancies between public and private institutions in the response to COVID-19.

The main study measuring the students' perceptions of ERT on pharmacy education in Brazil was

conducted at the Faculty of Pharmacy of the Federal University of Minas Gerais (UFMG), one of its most traditional pharmacy schools. The authors assessed different aspects of the model adopted in 2020 [17]. Most of the respondents approved the remote model, reaching medium to high scores in terms of satisfaction. However, the sample represented less than 40% of pharmacy undergraduate students of the institution, and the metrics considered the teachers' compliance to academic norms as criteria to measure students' satisfaction, which does not necessarily translate into educational quality [17].

Reasonably, the most critical aspect for the students of UFMG during the pandemic was the quality of laboratory/practical lessons [17]. Development of practical skills in the virtual environment remains a challenge for higher education, especially for a course that requires laboratory lessons and clinical skills. The mere virtual demonstration of the techniques does not allow the students to practice or correct eventual mistakes, depending exclusively on the internships to capacitate themselves. In addition, many efforts to better connect pharmaceutical education with the health care system may have been weakened by the pandemic, compromising technical visits, field trips, and other in-person experiences besides the curricular internships.

Comprehensive development of skills related to pharmaceutical care was also a major obstacle to e-learning. Even realistic simulations with patients present inherent losses when performed in virtual meetings. Among the challenges of this method, there is the difficulty to evaluate non-verbal communication and the lack of physiological parameters measurements (heart rate, respiratory rate, and blood pressure). These were the main limitations of a course developed on ERT to target clinical CMM competencies in the context of the COVID-19 pandemic at a Brazilian public university, despite its positive outcomes (article in progress) [19].

Regarding structural challenges of virtual learning, limited access to the internet and electronic devices is a major concern when implementing ERT or hybrid models. Nonetheless, a study with data from 2018 demonstrated that the vast majority of Brazilian undergraduate students dispose of access to the internet (99,3%), and there was no significant difference between private or public schools in this aspect [18]. Yet, at any rate, technical and economic limitations should not be neglected to avoid evasion and exclusion of vulnerable students. Even for those with regular access to the internet and a functional electronic device, the dependency on a stable and good internet connection for a successful exam or presentation may intensify the students' apprehension and anxiety-related feelings.

Concerning mental health issues, a study with data from 2019 found a high prevalence of medications for anxiety and depression among Brazilian

pharmacy students before the COVID-19 crisis. Most of the participants believed that their medical treatment was influenced by their experience in pharmacy school [20]. To investigate the crisis impact on this scenario, a cross-sectional study with data ranging from 2019 to 2020 specifically targeting Pharmacy undergraduate students at a Brazilian university reported an increase in symptoms of depression [16]. 45.4% of the students had severe psychological impacts. As pointed out by the authors, these symptoms are not only concerning for the student's safety but also for a subsequential reduced interest in activities previously considered important, which may directly impact the assiduity and commitment of the students [16].

Interestingly, in this study, the prevalence of symptoms related to anxiety had decreased in the first moment of the pandemic [16]. The authors correlated these results with the temporal orientation of the pandemic, but other aspects such as flexibility and ease to cheat in exams should be considered. It is also fundamental to investigate to what extent the psychological symptoms can be attributed to the new methods of learning pharmacy education. Thus, further research on this topic is essential to guide new interventions, preventing educators from unnecessarily adapting their methods in an effort to help the students when the actual problem could rely on other instances.

5. Perspectives for Pharmaceutical Education on the post-pandemic context

The pandemic has challenged health care workers in all aspects, and many of them had to remodel their workload and adapt their daily activities to the new reality, constantly searching for updated evidence on the disease. Pharmacists acted on the front line against COVID-19 in different scenarios, but the direct contact with patients in drugstores, pharmacies, and hospitals should be highlighted. Pharmacists were confronted with massive irrational use of drugs and uncountable fake news about the infection, the virus origin, and especially the vaccines. In Brazil, this infodemic of disinformation happened with reinforcements from the federal government, and several ineffective drugs were organized in the so-called "covid kit" (Kit-covid), including chloroquine/hydroxychloroquine, azithromycin, ivermectin, and nitazoxanide [9,21,22].

This worrying scenario raises the need for professionals who take the lead in the fight against iatrogenesis, who support public health by encouraging vaccination and providing guidance on the rational use of drugs. Despite the remarkable efforts from the traditional media vehicles to clarify

the facts about COVID-19, health care professionals should assume a central position as spokespersons of Evidence-Based Healthcare [23]. Especially for pharmaceutical care services, the primary take-home message from the pandemic should be scientific literacy, promoting Evidence-Based Health Care in their work environment, and instructing patients with accurate information. For the education of these professionals, this points to the need of reconsidering lecture-based learning in pharmacy schools and reflecting on the real development of abilities and competencies [13,24].

Besides the challenges, ERT has also created an opportunity for educators to explore several new tools in the virtual environment. The use of active learning methodologies, already a growing trend in pharmaceutical education in the last decade, was adopted by some teachers to engage the students in isolation [19,24,25].

A study developed at the University of São Paulo (USP) discussed the experience of using educational games in the area of Pharmaceutical Services and Public Health in the context of the COVID-19 pandemic [25]. In this experience, the students were organized into groups to create, each one, a version of a classic game adapted to a topic of study. The authors reported improvements in the students' motivation, but objective parameters were not measured. A serious limitation of this strategy was also observed: the students did not play their games after the work was done, which mischaracterizes the original purpose of making the study playful. All the efforts were concentrated on the development of games that were not even used [25]. Therefore, it should be interesting to better investigate objective outcomes related to the use of educational games in pharmacy education, prioritizing experiences in which the students can play.

Another innovative aspect in pharmaceutical education during the pandemic came directly from the Brazilian federal government, which called for health care students to collaborate on the front line against COVID-19. This public call was entitled "Brazil Counts On Me" (Brasil Conta Comigo), and the project was aimed to recruit volunteers from undergraduate courses in Medicine, Nursing, Physiotherapy, and Pharmacy. However, there was no detailed description of the activities, which could be out of the scope for the student; and the interns had no health insurance or employment security [9]. Professional societies discouraged the initiative [9]. Still, this type of project could potentially nourish teaching-service-community integration if developed with more criteria. Thus, the recruitment of interns to cope with epidemic situations in the public health care system should still be considered in the future as a strategy that can provide human resources in a period of need and also train a qualified workforce with experience in dealing with crises.

Among pharmacy trends in the pandemic setting,

the fast expansion of telehealth accelerated by the pandemic context can not be neglected. In this context, pharmaceutical nonprescription telehealth consult services were pointed out as valid strategies to optimize the health care systems and reduce in-person medical appointments during the COVID-19 crisis [8]. Besides the multidisciplinary approaches, pharmaceutical services such as CMM are now frequently conducted through telephone or internet platforms, and the best use of these platforms should be explored during the professional's formation. As it is crucial for the students to be adapted and comfortable in the virtual environment, it would be appropriate to develop online pharmaceutical care training during the course, even after the complete return of in-person classes.

6. Conclusions

Despite some inherent challenges, the studies on the topic have demonstrated generally positive perceptions from the students on the remote learning experiences during the COVID-19 pandemic, but qualitative research is fundamental to comprehend the barriers and facilitators of this experience and guide future adaptations. Higher education institutions are highly recommended to assess students' satisfaction with the models developed, but they should be able to better involve students in the feedback process, as the available studies showed low participation rates.

As perspectives for the future of pharmaceutical education, the experience of remote learning might also create a demand for hybrid options in the next few years, once the students have experienced the advantages of this model. Although the offer of Pharmacy online degrees in Brazil remains a controversial topic, some level of flexibility seems to be inevitable. In this context, the advances in telehealth and online pharmaceutical care services represents an opportunity for pharmacy schools to explore the virtual environment approaching this field.

The pandemic has also highlighted the crucial need to improve scientific literacy in health care education. More than ever, a pharmacist must be able to find and judge scientific evidence, avoid unreliable sources and misleading statistics, and effectively translate knowledge into information for the patients. These should be reinforced during all the professional education, and active learning methodologies might be useful tools to consolidate related abilities and competencies during the academic journey.

Further research is crucial to understand the social and internal demands for pharmacy education in Brazil and to base new interventions in the educational system after the decisive experience of a pandemic.

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