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COMMENTARY

# Digital pharmacists: the new wave in pharmacy practice and education

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## Abstract

Pharmacists now face the biggest challenges in the history of the profession: the use of digital technologies in pharmacy practice and education and the outbreak of coronavirus disease 2019. Worldwide, pharmaceutical care and pharmacy education via digital technologies have significantly increased and will be incorporated into patient care and the teaching–learning process, respectively. Thus, in this new era of pharmacy practice and education, curricula should promote the development of specific competencies for the cognitive, conscious, and effective use of digital tools. This requires the training of "disruptive" educators, who are capable of using teaching–learning methods adapted to the digital environment and educational processes suitable for stimulating the use of effective disruptive technologies. This commentary argues that the pharmacy profession can no longer wait for the slow integration of digital technologies into pharmacy practice and education.

**Keywords** COVID-19 · Digital technology · Education · Pharmacy · Pharmaceutical care · Professional competence

In "The third wave in Pharmaceutical Education: the Clinical Movement," Hepler (1987) outlined three distinct phases of pharmaceutical education: "The Empirical Era" (until 1940), "The Science Era" (1940–1970), and "The Patient Care Era" (after 1970) based on clinical pharmacy [1]. In addition, Hepler (1988) argued that technology (i.e., computers, robotics, communications, and therapeutics) and economic and social values would pose significant challenges in the future [2]. A decade later, the World Health Organization published a document entitled "Preparing the future pharmacist: curricular development," which recommended the development of specific knowledge, attitudes, skills, and behaviors to support pharmacist roles in the healthcare system [3]. According to this document, the "future pharmacists" must be caregivers, decision-makers, communicators, leaders, managers, lifelong learners, and teachers. These "future pharmacists" are not the current pharmacists and are facing one of the greatest challenges in the history of the profession: the use of digital technologies in pharmacy practice and the outbreak of coronavirus disease 2019 (COVID-19).

During the COVID-19 pandemic, community pharmacies have become an increasingly important first point of contact with the healthcare system for individuals with health concerns or who require reliable information and advice [4, 5]. Despite continued face-to-face activities in community pharmacies during the pandemic, the need for social isolation has accelerated disruptive changes in patient care practices. Thus, the Internet and other communication media, such as phones and computers (teleconsultations), have been more frequently used to provide care to patients who are physically distant [4, 6–10].

The use of teleconsultations in pharmaceutical care has been discussed for many years [11–17]. Currently, considering the restrictions imposed to combat the pandemic and the need for broad social isolation, pharmaceutical care via teleconsultations has significantly increased worldwide.

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There are reports on the use of digital technologies to provide clinical pharmacy services, such as health education, chronic disease management, and medication review [4, 6–10, 18]. There is no doubt that after the pandemic, these practices will be incorporated into the patient care process in many countries. However, it is important to consider that there are different levels of access to these technologies in different countries and populations: patient factors such as economic status and digital skills may impact individuals' ability to use technology.

At present, access to electricity and the Internet represent barriers to the use of digital technologies in some countries [19–22]. Consequently, people who are economically and socially vulnerable, especially in poorer countries, may be excluded from health services provided through digital technologies during the COVID-19 pandemic [23]. In addition, there are other barriers, such as the absence of a suitable private space for teleconsultation at home and lack of awareness of this service [24]. Such issues faced by these populations are examples of digital inequality, which may arise from poor literacy, difficulty in accessing digital technologies, or a lack of active participation in the digital society. Thus, the use of technologies in pharmacy practice will occur at different "speeds" globally, as well as in different population groups. To minimize these inequalities, pharmacists must be empathetic, seek effective ways to meet the individual needs of patients, interact with physicians, and make use of technologies in transition, such as phone calls and smartphones [25]. Conversely, there are benefits to teleconsultations such as reduced travel time or effort to go to the consultation, family members being able to attend the appointment, patients may be more relaxed from home, and patients' independence (they do not have to rely on others) [24].

In addition to the use of teleconsultations, there is a growing integration of other digital technologies in pharmacy practice, such as robotic and barcode drug dispensing, patients' electronic health records, computer-based support systems for decision-making, and the use of artificial intelligence and big data [26–29]. With regard to this theme, a matter of fundamental importance and necessity is designing robust studies that seek to adopt evidence-based approaches in implementing and evaluating digital interventions from multiple perspectives, thus establishing high-quality evidence that may benefit diverse stakeholders (i.e., directors, supervisors, pharmacists, pharmacy staff, physicians, nurses, other healthcare professionals, and patients). Therefore, implementation science, behavioral theory, and multiple stakeholder perspectives are being used in pharmacy practice to support evidence-based approaches in implementing and evaluating pharmaceutical interventions/services (with or without the use of digital technologies) [28–33].

In this new wave of pharmacy practice, the curricula should promote the development of specific competencies for the cognitive, conscious, and effective use of digital tools. The intensive and pervasive use of technologies while providing pharmaceutical care to the patient will require the development of social, humanistic, and behavioral competencies (i.e., ethics, empathy, and communication skills), clinical competencies (i.e., those related to pharmacotherapy, information on medicines, patient safety, and provision of care to specific groups), and digital competency (so-called also digital literacy or e-skills) [34–37]. However, it is important to note that digital literacy devoid of humanistic competencies, such as the ability to care and interact in an uncertain environment, may exacerbate technocratic character. Thus, future pharmacists must develop empathy, a culture of care, and the ability to judge benefits and risks in a non-binary way in uncertain environments. That is, technology should be used to replace mechanical and repetitive actions, enabling pharmacists to act cognitively in an efficient way.

With regard to communication skills, it is important to emphasize that the skills needed for pharmaceutical care using technology may be different from those required for pharmaceutical care in which the patient is physically present. In some situations, the skills are similar, but they become even more significant because of the patient's physical absence. For example, in pharmaceutical care through teleconsultations using video, the professionals must be aware of issues such as: speaking slowly; using nonmedical terms (lifestyle video communication may be used, such as FaceTime®); minimizing gestures and body movements (to avoid poor viewing or blurring in the video) in full camera view; delays in communication; looking at the camera instead of looking at the screen (to maintain "eye contact") [38, 39]. In teleconsultation through phone calls, even greater attention should be paid to auditory nonverbal skills (i.e., choice of words and tone), active counseling, and active listening, as well as posing a question in different ways [40].

In this context, the increasing incorporation of technology in pharmacy practice and new competencies necessary for technology use occur in the scenario of transition between two generations of students: generation Y (or "millennial," born between 1981 and 1996) and generation Z ("Gen Z" or "digital natives," born between 1997 and 2012) [41, 42]. Millennials, accounting for approximately 25% of the current workforce, are influenced by the expansion of information technology and connected global culture [43]. This generation has preferences for learning styles related to experience, technology, and entertainment [44, 45]. Gen Z individuals, who are habituated to "new" technologies, have a learning style related to observation and practice and are more worried about the appreciation of their contributions and responsibility

[46–49]. Furthermore, these individuals want to ensure that their university education adds educational value, and they exhibit a low tolerance for people who do not readily understand changes [47–49].

Recent studies (commentaries) have discussed the impact of the Fourth Industrial Revolution on the pharmacy profession [26, 27]. However, these studies focused on professional practice rather than pharmaceutical education. As Hepler (1987) stated, a new wave in pharmaceutical education is not the "last word" in the training of future pharmacists for patient care challenges faced by educational institutions and professionals [1]. The new wave in pharmacy practice and education requires training disruptive educators, who are capable of using teaching methods adapted to the digital environment and using educational processes suitable for incorporating and stimulating the use of effective disruptive technologies, such as artificial intelligence, virtual reality, big data, and wearable technology, for students who are digital natives [26, 50, 51].

The use of digital technologies in pharmacy education increased after the beginning of the COVID-19 pandemic [52]. Due to health measures imposed by the pandemic, many pharmacy courses have increased the use of technology or changed teaching to a remote format (online and without face-to-face interactions) [53, 54]. Despite this, some barriers to the use of digital technologies in pharmacy education, such as access, infrastructure, inadequate ability to use technology, and resistance to change were also evident [55]. In addition, there are barriers related to the assessment process, such as changing assessment weighting and assessment methods (including the use of time-constrained examinations or open-book examinations), distractions during the assessment process in the home environment, educators' insecurity to provide a fair assessment among students, and limited communication and feedback from educators with students, respectively, in planning assessments and on their performance due to work overload. Conversely, the support of professors by the university, their own departments, senior professors, professors, and students with previous remote online teaching–learning experience were facilitators in the use of digital technologies in pharmacy education during the COVID-19 pandemic [56].

After the pandemic, the "new normal" of pharmacy courses will be characterized by the continuous improvement of technology through new ways (face-to-face, remote, or mixed) of teaching, monitoring, and evaluating learning [54, 57]. The hybrid teaching–learning environment combines the benefits of face-to-face and remote environments. This teaching–learning environment is feasible for pharmacy education; however, it requires consideration of the multidimensional nature of this educational method, as well as careful construction, facilitation, and optimization in response to student feedback [58].

For more than 10 years, reports from the United States have highlighted that improving the training of educators is essential for training future pharmacists [22, 59]. It is also relevant to highlight that new or renewed educators are not solely responsible for training future professionals. Moreover, it is necessary to have tutors linked to the practice of monitoring trainees in clinical care, highlighting all the possibilities for using technology to optimize patient health outcomes. In addition, it is essential to provide internships for native digital students to promote the proactivity, empathy, and co-responsibility required to meet new social needs and generate models of patient care.

Another aspect to be considered while training the new generation of digital-native pharmacists is their greater capacity for self-directed learning with a focus on using technologies aimed at care practice, such as digital serious games, virtual patient software, and virtual or augmented reality [48, 60]. Systematic reviews and meta-analyses have shown that these technologies are effective in developing knowledge, skills, and attitudes related to patient care [61–66]. During this generational transition, it is necessary to recognize the numerous advantages of these tools in professional development, because these tools allow the simulation of clinical practice situations in safe and controlled environments for learning, with no risk of patient harm, but with the possibility of students' reflection as well as continuous feedback on learning and performance [62, 65–71].

Notably, the use of technology without any clearly defined pedagogical objectives does not guarantee the attainment of the desired educational goals [72]. Thus, educational technologies must be developed, evaluated, and validated synchronously to ensure the effectiveness of the proposed learning objective. In addition, technology must be integrated gradually into the curriculum and other traditional educational methods or tools at increasing levels of complexity [73–75]. Therefore, the new wave in pharmacy education might involve both analog and digital technologies for developing competencies for patient care through reading, lectures, case discussions, digital serious games, virtual patient software, virtual or augmented reality, simulated patients, and provision of care to real patients.

Pessimists argue that the Fourth Industrial Revolution, with an emphasis on automation and artificial intelligence, may lead to the extinction of traditional, mechanical, and repetitive professional practice, reducing the importance and social needs of pharmacists [26]. According to Gregório and Cavaco (2021), automation and artificial intelligence have been gradually integrated into routine practice, optimizing the time and availability of several health professionals for patient care. Thus, these authors argue that when considering that the pharmacist's role in healthcare is rooted in caring for the community, the principal issues for the future of the profession are the development of actions related to

healthcare management and defending patient rights [27]. Therefore, in the new wave of pharmacy practice and education, digital pharmacists need to be empathetic and value patients as human beings. Consequently, the profession can no longer wait for the slow integration of digital technologies in pharmacy practice and education. While we have discussed this theme, the present has already become the past, and the future has become the present. In fact, the future is now!

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