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REVIEW
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Teaching of pharmaceutical care in Latin America: a structured review

Enseñanza de la atención farmacéutica en América Latina: una revisión estructurada

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Abstract

Objective: To systematize the information available on the teaching of pharmaceutical care, at the undergraduate and postgraduate level, in Latin America describing the current situation, perspectives, challenges, and recommendations.

Method: A structured review of works related to the teaching of pharmaceutical care in Latin America was made in PubMed, Scopus, Scielo, and Google Scholar, without time limit. Additionally, an internet search of study plans of the different pharmacy programs in this region and the accreditation status was performed.

Results: Thirty-six publications on the teaching of pharmaceutical care were identified. In addition, information from 146 pharmacy study plans with predominance of the active teaching methodology; so 25 postgraduate studies in the healthcare area was obtained. The percentage of accredited programs was 31.8% and 37.7% for graduate and postgraduate programs, respectively. Brazil was recognized by the use of simulation, information, and communication technologies, and addition by frequency of the blended education; while Colombia by the incorporation of early practices at the healthcare level.

Conclusions: The information available in publications and study plans demonstrates a growing interest in the teaching of pharmaceutical care in Latin America. However, it is necessary that universities perform integrated work with health institutions, in pro to get the accreditation of their services for teaching. Likewise, harmonize concepts and early practices that help to optimize teaching and promote the results divulgation obtained.

KEYWORDS
Clinical pharmacy; Community pharmacy; Curricular network; Curriculum; Hospital pharmacy; Pharmaceutical care; Teaching.

Resumen

Objetivo: Sistematizar la información disponible sobre la enseñanza de la atención farmacéutica, a nivel de pregrado y posgrado, en Latinoamérica, incluyendo la situación actual, perspectivas/desafíos y recomendaciones.

Método: Revisión estructurada de trabajos relacionados con la enseñanza de la atención farmacéutica en Latinoamérica, en PubMed, Scopus, Scielo y Google Scholar; sin límites de tiempo. Adicionalmente, se realizó una búsqueda en internet de los planes de estudio de los diferentes programas de farmacia en esta región y el estado de acreditación de los mismos.

Resultados: Se identificaron 36 publicaciones sobre la enseñanza de la atención farmacéutica. Además, se obtuvo información de 146 planes de estudio de farmacia, con predominio de metodologías de enseñanza activas, al igual que 25 posgrados en el área asistencial. El porcentaje de acreditación fue del 31,8% y del 37,7% para programas de pregrado y posgrado, respectivamente. Brasil se destacó por el uso de simulación, tecnologías de la información y las comunicaciones, al igual que por educación semipresencial; mientras que Colombia destacó por la incorporación de prácticas tempranas a nivel asistencial.

Conclusiones: La información disponible en publicaciones y planes de estudio muestra un interés creciente en la enseñanza de la atención farmacéutica en Latinoamérica. Sin embargo, se requiere que las universidades realicen un trabajo integrado con las instituciones de salud, orientado a acreditar sus servicios para la docencia. Asimismo, es necesario armonizar conceptos y prácticas tempranas que ayuden a optimizar la enseñanza y propiciar la divulgación de los resultados obtenidos.

PALABRAS CLAVE
Atención farmacéutica; Enseñanza; Farmacia clínica; Farmacia comunitaria; Farmacia hospitalaria; Plan de estudios.

Introduction

Pharmaceutical Care (PhC) was established in the 90s in the United States, and extended quickly at global level, as a significant practice and option for work development among Pharmacists around the world[1]. The essence of this discipline is to improve the process of using medications and, through this, health results, including the quality of life of patients. This involves a change of approach for the pharmaceutical profession, an evolution from being product-oriented (medication dispensing) to patient-centered. This change requires an adjustment in the study plans of Pharmacy programs, so that the Pharmacist can acquire the skills required to perform effectively this new approach[2]. Generally, this change has developed gradually, but with practical and structural limitations. Additionally, the coexistence of terms associated with PhC (such as clinical pharmacy, hospital pharmacy and pharmacotherapeutic follow-up) could be a barrier for the development and implementation of PhC. Therefore, different authors and organizations have worked in order to overcome this limitation[3-5].

The World Health Organization (WHO) and the International Pharmaceutical Federation (FIP) have published guidelines for the pharmaceutical professional activity and its involvement in pharmaceutical education, such as: 1) *The development of Pharmacy Practice: focused on patient care,* intended to orientate pharmacist trainers in the professional activity and to highlight the need for continuous education as update strategy[6]. Besides, this document defines and presents a general understanding of the meaning and development of PhC at all its levels[6]. 2) *Joint FIP/WHO GPP: Standards for Quality of Pharmacy Services*, presenting a set on Good Pharmacy Practices, which includes, among other aspects, the definition of good practices in Pharmacy, the requirements to conduct a good professional activity, and the rules required for its development[7].

Currently, a great number of scientific publications in European countries, the United States, and even some from Latin America, are presenting clinical, economic and humanistic results associated with PhC. Besides, holding Hospital Pharmacy[8] or PhC congresses has been one of the strategies used in Latin America in order to strengthen PhC practice. In these congresses, there have been presentations and discussions about theoretical concepts and practical experiences associated with research and health results, attributed to the incorporation of PhC in Latin American health systems[9-12].

Regarding teaching on PhC, the following contributions stand out: 1) The "Pharmaceutical Care in Community Pharmacy" Workshop-Conference (2013) and the "Pharmaceutical Care at University" Workshop-Conference (2014); in these, "a collaboration work was initiated, and the foundations were created for a closer and more effective relationship between the University and the Profession, in terms of the training needs by Pharmacy graduates"; 2) The Third Workshop-Conference of the Forum on Pharmaceutical Care in Community Pharmacy (Forum AF-FC) and the University in 2016: "Teaching Pharmaceutical Care at University: Towards a discipline of Pharmacy Care". These contributions have looked to define "*the learning objectives and the minimum contents for students to acquire a set of specific skills in the PhC services*"[13].

In this setting, even though there is information regarding PhC teaching in Latin America, it is necessary to have a publication that integrates and coordinates the information available about PhC training. For this reason, the objective of this article was to systematize the information available on PhC teaching in Latin America, at graduate and postgraduate level, including the current situation, perspectives, challenges and recommendations.

Methods

A structured review was conducted in the following databases: PubMed, Scopus, Scielo and Google Scholar, in order to identify all articles, original or reviews, about PhC training in Latin America. The search strategy included the terms: pharmaceutical care, *atención farmacéutica,* teaching, *enseñanza* and *Latinoamérica*. The inclusion criteria were: articles with results directly associated with the objective of the review, published in English, Spanish or Portuguese, with access to the complete text, and no limitations in terms of publication date. In order to identify the articles, it was confirmed that the search terms appeared in the title or the abstract. Article review was conducted independently by two of the authors of the review. Any disagreement was solved by consensus among the authors. Besides, references were included in the articles selected, considered as relevant for review.

Additionally, a search was conducted in the plans of study for graduate and post-graduate PhC, in the different Schools of Pharmacy in Latin America. For this aim, the only information used was that available to be consulted in the different websites. Out of the PhC curricula reviewed, other associated topics curricula were analyzed, such as Community Pharmacy, Pharmaceutical Care, Clinical Pharmacy, Hospital Pharmacy, Pharmacovigilance, and dispensing.

Results

Out of 355 articles identified, 36 met the objective of the review (Figure 1), and therefore were associated with PhC teaching in Latin American countries: from Brazil (12), Cuba (8), Colombia (4), Costa Rica (3), Mexico (3), Peru (2), Argentina (1), Chile (1), Guatemala (1) and Uruguay (1). No publications from Bolivia, Ecuador, Honduras, Nicaragua, Panama, Paraguay, Dominican Republic or Venezuela were retrieved in this search. Table 1 describes the publications by country.

Current situation of Pharmaceutical Care teaching in Latin America

A work group from the Pan American Health Organization recommended in 1998 a Basic Plan for Pharmaceutical Education, which incorporated[49]:

- Subjects on Community Pharmacy, Hospital Pharmacy, Pharmaceutical Industry, teaching and research, as areas for common pharmaceutical practice.
- Use of a teaching methodology where the student is the central axis of the teaching-learning process; as well as the incorporation of activities to develop critical thinking, encourage solving problems, team work, communication and leadership skills, integration of knowledge, and the use of information and communication technologies.
- Permanent training for teachers.

Even though not strictly for PhC, there are developments in Hospital Pharmacy associated to resident programs in **Argentina**, **Brazil and Peru**. However, only in **Brazil and Argentina** there was a noticeable trajectory in formal education for this specialty[26].

On the other hand, the School of Pharmacy of the Universidad de **Chile** has made changes since 1998 to their Clinical Pharmacy courses, directing them towards the PhC philosophy; this has been one of the first signs of the Chilean approach for PhC teaching[26].

In **Cuba,** the process for PhC implementation developed from a research intended to address the need to strengthen Pharmacist training for working within the healthcare team[35]. Even though it was recorded that the plans of study for pharmacy in Cuban universities include new knowledge and skills required for PhC, this information was not available on-line.

In **Costa Rica**, PhC is the transversal axis for the plan of study at the School of pharmacy of the Universidad de Costa Rica; besides, patient is the center, and all knowledge, attitudes, skills and abilities that are intended to be generated in students will converge towards the patient. These changes in study plans are intended to train better Pharmacists, adequate to the needs of our current situation[31].

In **Mexico**, changes were detected in the areas of professional practice by the Pharmacist, primarily Community and Hospital Pharmacy, as well as the inclusion of the PhC concept[43]. Since then, schools of pharmacy have tried to amend their study plans, including a more practical teaching methodology, and directing learning towards solving problems and developing skills for communication, leadership and responsibility in making decisions on therapy and patient care[43].

In **Peru,** different barriers have been identified for the implementation of PhC in pharmaceutical centers. Basically, limitations are reported in: 1) research designed to determine the educational gaps between universities; 2) number of courses focused on PhC activities; 3) proportion of practical activities with patients; 4) specific training to offer PhC in the graduate and postgraduate settings; and 5) in the record of evidences for patient benefit[47].

In **Uruguay**, the optional subject of PhC was incorporated since 2000 in the Universidad de la República in the study plan for the Pharmaceutical

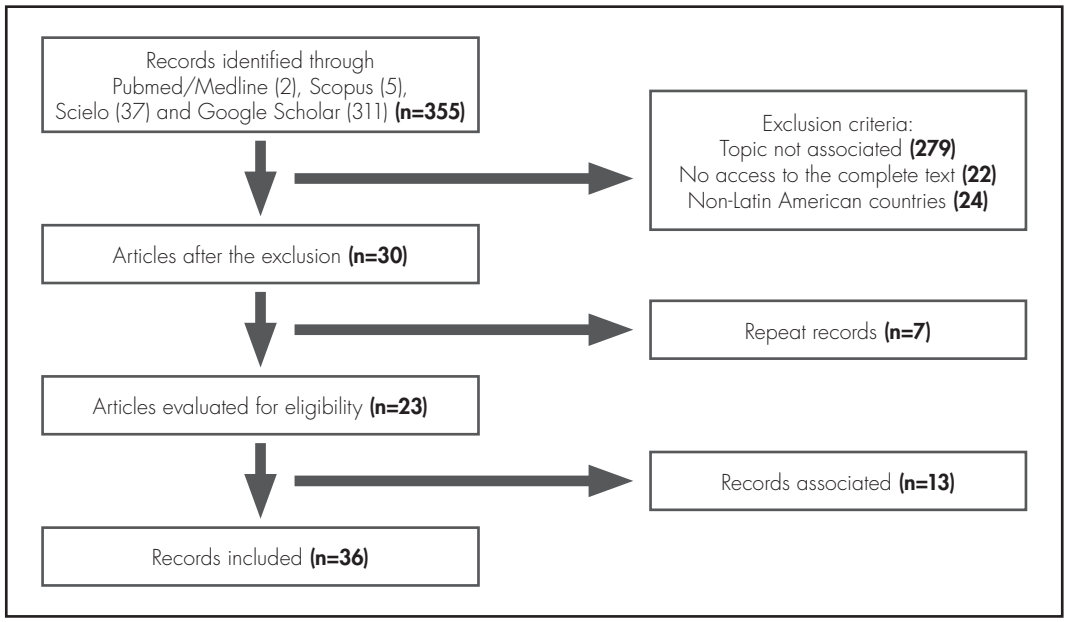

Figure 1. *Flow diagram of the search, detection and selection of the articles included in the review.*

Chemistry program. Besides, an active method of teaching was adopted for teaching PhC, which has allowed the development of practical skills in students.

In **Colombia**, there was a change in the study plan for the Pharmaceutical Chemistry program of the Universidad de Antioquia in 1987, where PhC was incorporated as a new subject, and Clinical Pharmacy as compulsory[50]. Subsequently, between 1998 and 2000, the PhC Specialty was created; and since the year 2000, the Group for Pharmaceutical Research, Promotion and Prevention has generated evidence for PhC strengthening and development in the country[50]. On the other hand, the Labor Observatory for the Pharmaceutical profession reported in 2015 that the Pharmacy programs in the country had conducted amendments in their study plans, including an increase of subjects within the patient care area, and PhC, clinical pharmacy and dispensing concepts, among others[29].

Plans of study or curricula

Information was collected from the study plans of 146 universities offering pharmacy programs in 18 Latin American countries; 55 (37.7%) of these programs are accredited, and the degrees granted are: Pharmacist, Pharmaceutical Chemist, Bachelor in Pharmacy, Bachelor in Pharmaceutical Chemistry, Biologist Pharmaceutical Chemist, Biochemist, Pharmacobiological Chemist, Biotechnological Pharmaceutical Chemist, Industrial Pharmaceutical Chemist, Biochemist and Pharmacist. Figure 2 shows the number of Pharmacy programs per country, with access to their websites and their on-line plans of study.

In **Brazil,** there was access to 44 plans of study from the same number of universities. Overall, the creation of the Single Health System (SUS) stood out in 1988; this generated, since 2002, the need to reorganize the study plan for the Pharmacy degree, oriented towards training a Pharmacy professional with the ability to offer PhC services in the health system[51]. Accordingly, 100% of universities include PhC teaching; 75.0% include Clinical Pharmacy and 88.7% include Hospital Pharmacy. On the other hand, accreditation for Pharmacy programs was observed in 29.5% of the universities in this country.

In **Argentina**, according to the information available for the study plans from 16 universities, 37.5% of these included PhC teaching, and 81.3% included clinical pharmacy. However, the micro-curriculum for some of the clinical pharmacy subjects includes topics such as Pharmacy and Therapeutics, Patient Follow-up, and Pharmacovigilance, which are associated with Pharmaceutical Care. Accreditation was only referenced in 31.2% of Pharmacy programs.

In **Mexico**, no evidence of PhC teaching at graduate level was found in 15 universities; however, five (33.3%) study plans included teaching Hospital Pharmacy. Besides, three universities offered post-graduate degrees, such as a specialization in Pharmaceutical Medicine at the Instituto Politécnico Nacional; a master in Pharmaceutical Sciences, with line on Pharmaceutical Care and Services, at the Universidad Autónoma Metropolitana of Xochimilco, and another one on Clinical Pharmacy at the Universidad Veracruzana. The accreditation of pharmacy programs was identified in 78.6% of these.

In **Chile**, according to the plans of study from 10 universities, 60% included PhC as a subject; 80% included Community Pharmacy, and 100% Pharmaceutical Care and Clinical Pharmacy. Besides, 90% of them have accredited pharmacy programs.

In **Colombia**, only one program (11.1%) of the nine universities that offer the pharmacy program included a specific PhC subject. However, PhC teaching forms part of the contents of subjects such as Clinical Pharmacy and Hospital Pharmacy. In this sense, 55% included Pharmaceutical Care and 45% included Clinical Pharmacy. Moreover, the program by the Universidad de Antioquia includes early academic practices in the community (level 3 – second year), academic practices in Pharmacy services and centers (level 5 – third year), academic practices in the productive sector (level 6 – third year), practices in Clinical Pharmacy (level 9 – fifth year) and final academic practice (level 10 – fifth year, either in the industrial or healthcare sector). In Colombia, 66.7% of universities had accreditation for the program.

In **Costa Rica**, 75% of the four programs reviewed included in their plan of studies the subjects: Community Pharmacy, Pharmaceutical Care, and Clinical Pharmacy; but PhC teaching was only specified in one of them. Three out of these four programs have high-quality accreditation.

In **Paraguay**, two (40%) of the five pharmacy programs found included PhC as a subject, and two had accreditation.

In **Cuba**, no plans of study were available in their university websites. However, Alina Martínez states that all Pharmacy programs are accredited by the Cuban Council for Higher Education Accreditation (CCAES), the organization responsible for developing and evaluating education standards[37].

On the other hand, no on-line evidence was found for the countries below regarding accreditation for pharmacy programs:

- **Nicaragua,** with seven plans of study, which have subjects such as Hospital Pharmacy but not PhC, and Community Pharmacy in only 71.5%.
- **Panama,** with four universities offering the pharmacy program: 75% included PhC and 100% Hospital Pharmacy.

Table 1. Objects of study in the research about PhC training in Latin America

Country	Author	Year	Main reflections
Argentina	Rousseau M[8]	2017	Harmonization in university programs in the pharmacy grade and limited post-graduate training.
Brazil	Lyra D, *et al.*[14]	2000	Structuring pharmacy training in Brazil in order to train adequate professionals in PhC for the Brazilian society.
	Rossignoli P, *et al.*[15]	2004	To show evidence about the implementation of a new plan of study for training General Pharmacists.
	Novaes M[16]	2006	In Brazil, the Pharmacist is an essential professional at hospital.
	Carpes A, *et al.*[17]	2009	Reorientation in Pharmacist training in Brazil.
	Ricetto M, *et al.*[18]	2010	The importance of simulation in PhC teaching.
	Galato D, *et al.*[19]	2011	Analysis of the difficulties found in the theoretical and practical training on PhC.
	Limberger J[20]	2013	Incorporation of active methods for PhC teaching-learning at the Centro Universitario Franciscano.
	Czepula A[21]	2015	Implementation of active methodology, in blended education, in the teaching-learning process applied to students in the PhC I and II disciplines.
	Mesquita A[22]	2015	Description of active learning methodologies in PhC teaching.
	Menéndez E, *et al.*[23]	2015	The use of virtual patients for the development of the skills required for PhC practice.
	Deuschle V, *et al.*[24]	2015	A review on the main aspects associated with the current teaching of pharmacy in Brazil.
	Monteguti BR, *et al.*[25]	2016	Adoption of the national guidelines on plans of study for the pharmacy program.
Chile	Ruiz I, *et al.*[26]	2002	Practical experiences in PhC according to the pharmacy plan of study.
Colombia	Salazar A, *et al.*[27]	2012	Pharmacist training in PhC through amendments in the plans of study for the graduate and postgraduate programs.
	Tobón F, *et al.*[28]	2013	Educational experiences that promote certain attitudes and skills for comprehensive PhC.
	Bertel A[29]	2015	Amendments in the plans of study for Pharmacy programs in Colombia, with a clear healthcare tendency.
	Ceballos J, *et al.*[30]	2017	Continuous education programs in order to strengthen skills for the improvement of PhC services.
Costa Rica	Baltodano B[31]	2006	Transformations in the study plan of the School of Pharmacy of the Universidad de Costa Rica.
	Aguiar T, *et al.*[32]	2008	Perception by pharmacy students from the Universidad de Costa Rica about PhC training.
	Arias F, *et al.*[33]	2013	Continuous education for clinical tutors who receive students from the Pharmacy Degree.
Cuba	Martínez A[34]	2009	Attitudes by pharmacy students towards PhC, after its introduction in the study plan.
	Martínez-Sánchez A[35]	2010	The Cuban experience in the process of PhC implementation in pharmacy teaching.
	Martínez A, *et al.*[36]	2010	Current status of Pharmacy education in Cuba, introducing the concept of PhC.
	Martínez A[37]	2011	Inclusion of social pharmacy in the pharmacy study plans, including: Community and Hospital Pharmacy, and PhC practice.
	Dupotey N, *et al.*[38]	2012	The influence of professional and psychosocial factors in PhC practice.
	Martínez A, *et al.*[39]	2012	Regardless of the efforts to generalize the PhC practice, this is far from being standard, and has not been yet accepted by Pharmacists.
	Gómez A, *et al.*[40]	2012	Study plans with a stronger approach towards teaching patient care skills.
	Martínez A, *et al.*[41]	2016	Educational trends for implementing a culture of excellence in PhC among Pharmacists.
Guatemala	Palacios H[42]	2014	The importance of Hospital Pharmacy practice among Pharmaceutical Chemistry students from the Universidad de San Carlos de Guatemala.
Mexico	Quirino C, *et al.*[43]	2000	A model of teaching-learning based on problems, included in the study plans of the pharmacy degree (including PhC).
	Quirino C, *et al.*[44]	2003	Schools of Pharmacy must accept new challenges: the management of information and communication technologies, and training teachers on education skills and design of learning situations.
	Fernández R, *et al.*[45]	2015	Educational needs in the pharmacy universities and academic programs in Mexico, which can be applicable to Latin America.
Peru	Álvarez-Risco A, *et al.*[46]	2007	Current development and potential future of the PhC activities and research in medical care settings in Peru.
	Álvarez-Risco A, *et al.*[47]	2016	Barriers that prevent conducting PhC in Peru.
Uruguay	Vázquez M, *et al.*[48]	2014	Experience of interaction by pharmacy students in PhC practice.

PhC: pharmaceutical care.

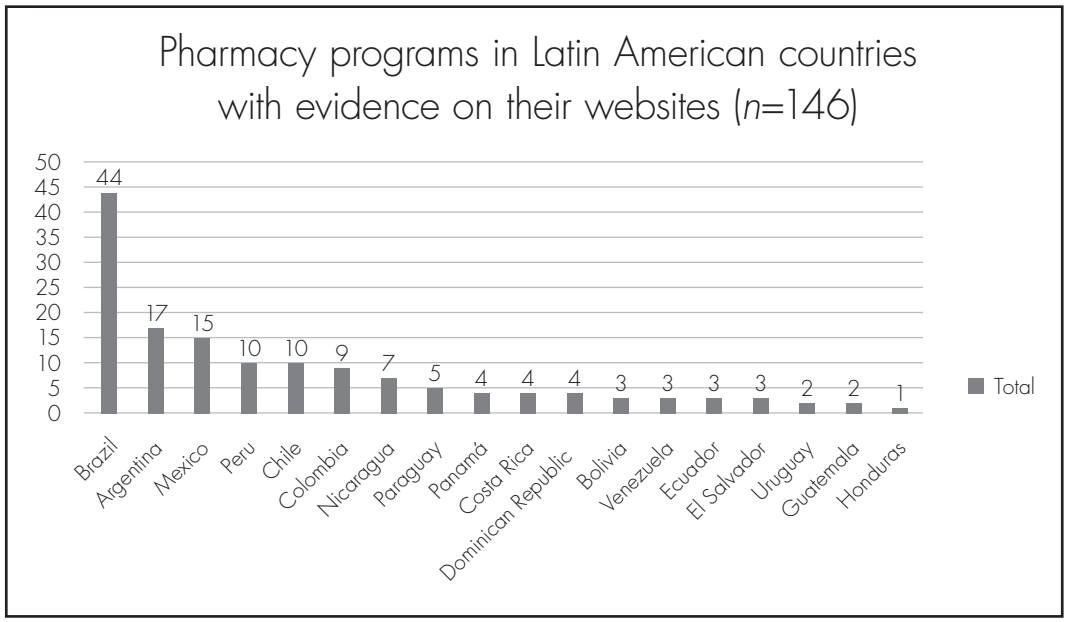

Figure 2. *Pharmacy programs in Latin American countries with access to their websites.*

- **Dominican Republic**, with four plans of study for pharmacy, but only 25% include the PhC subject; however, all four include Pharmaceutical Care, Clinical Pharmacy and Community Pharmacy.

Methodologies for teaching Pharmaceutical Care

Evidence of the use of active teaching-learning methods were identified in universities from Brazil[17,20-22,25], Costa Rica[32] and Mexico[43]. Active methodologies encourage critical-reflexive processes, with involvement and commitment by students towards learning. In the specific case of Mexico, the use of a model based on transformation objects or modular teaching was identified in the Universidad Autónoma Metropolitana-Xochimilco[43]. In Brazil, the Centro Universitario Franciscano reported using the study of cases with health issues, pharmacotherapy and drug-related problems. In this sense, it was worth highlighting the training of students able to intervene and build their own future with responsibility and commitment with a humanistic and general training[20]. Additionally, a doctoral thesis on the use of active methodologies for PhC training demonstrated a significant improvement in student performance, in terms of the perception of their skills for PhC practice, associated with satisfaction with the discipline[22].

Brazil was the Latin American country with the highest evidence of use of the simulation strategy for PhC teaching. Since 2002, the methodology of structured objective clinical examination was implemented in this country, targeted to evaluate the clinical abilities of students. This strategy consists of three stages: a) preparation of the place and the cases, b) simulation, and c) evaluation. This teaching system allows students to improve their skills and attitudes for providing PhC[19]. Additionally, the use of the Pharma VP system has been implemented; this is a tool that allows to simulate clinical cases and patient visits remotely. The authors considered that the Virtual Patient tool contributed to the development of the skills required for PhC practice, but that it should be used as a complementary technique[23]. In other Latin American countries, no publications were found regarding the use of simulation as a strategy for teaching PhC. On the other hand, the use of blended training, with positive results in PhC teaching, was another outstanding finding in Brazil. For example, the Pharmacy program at the *Universidad Federal de Paraná* showed the effect of this type of teaching on the generation among students of a sense of responsibility, self-evaluation, motivation, time management, and skills for accessing information[21].

Continuous education in Pharmaceutical Care

The review showed the need for continuous education in PhC, including permanent training and postgraduate courses for Pharmacists. In this context, the conclusion from a study conducted in the *Universidad de Costa Rica* was that it is necessary to generate training options for tutors, in charge of PhC teaching[33]. Additionally, some countries are implementing this type of educational programs for outpatient Pharmacists, such as compulsory and permanent learning programs, in order to improve the effects of PhC services[30].

Regarding postgraduate training, and according to the plans of study of the 146 universities with information available in their websites, 25 (17.1%) of them offered postgraduate courses associated with the patient care area; 7 of these (31.8%) had accreditation. In Brazil, it was worth highlighting the specializations in PhC, Clinical Pharmacy, Hospital Pharmacy, Pharmacy Prescription, as well as masters in PhC. On the other hand, Argentina (Universidad de Córdoba), Uruguay (Universidad de Uruguay) and Venezuela (Universidad Central de Venezuela) offered specializations in Hospital Pharmacy. In the same line, Bolivia (Universidad Mayor de San Andrés), Honduras (Universidad Nacional Autónoma) and Mexico (Universidad Veracruzana) had offers for master courses in Clinical Pharmacy. As well as the specialization in Hospital Pharmacy, the Universidad de Panamá also offers master courses in: Clinical Pharmacy, with emphasis on PhC; Oncology Pharmacy and Palliative Care, and Management of Pharmacy Services, with emphasis on patient care services.

The Universidad de Chile offers a doctorate in Pharmaceutical Sciences, with professional degree in Pharmaceutical Care, Clinical Pharmacy, and practice in Community Pharmacy; similarly, the Universidad de Antioquia in Colombia offers doctorate (and master) programs in Pharmaceutical and Food Sciences, with emphasis in PhC. The Universidad del Atlántico offers the specialization in Clinical Pharmacy, and the *Universidad de Cartagena,* a master course in Pharmaceutical Care.

Discussion

Perspectives / challenges in teaching PhC in Latin America

Even though some successful experiences have been published regarding PhC teaching and major changes in study plans, there is limited bibliography supporting the inclusion of PhC teaching in Latin America. However, when the information is complemented with that available in the websites of the universities with pharmacy programs, there is a significant improvement in the scenario, caused by the detection of a noticeable increase of the inclusion of PhC teaching in Latin America, either specifically or with similar subjects. However, it is necessary to harmonize concepts

and practices, in order to collect overall orientations and optimize PhC teaching. In this sense, the following can be highlighted, regarding the recommendations of the document generated at the SimpoDader 2016[13] (Table 2):

- In Latin America, there is evidence of the incorporation in the study plans for the pharmacy program of subjects such as Community Pharmacy, Pharmaceutical Care, Clinical Pharmacy, PhC, Hospital Pharmacy, among others. However, very few programs have included curricular practices allowing students to have an early interaction with patient care reality, as recommended by renowned organizations[13]. Brazil, followed by Colombia, are the countries that include this type of practices; though the five programs recently recorded in Colombia are not reflecting this recommendation, which could be due to the lack of professionals with a postgraduate degree in PhC in the health institutions or certified fields of practice, such as university hospitals.
- Continuous education programs are a key factor in Pharmacy education, as well as in the strengthening of the necessary skills and permanent learning in order to improve PhC services. Besides, there is evidence of the efficacy of pharmaceutical interventions which combine the use of Information and Communication Technologies (ICTs), continuous education programs, and networking among Pharmacists and other healthcare professionals.
- Brazil is the Latin American country with the highest evidence for PhC teaching through the use of ICTs and simulation. Overall, the use of ICTs is promoted throughout the world at all levels; however, in the specific case of Pharmacy services, this is a road still to be travelled, and, at Latin American level, still to be implemented.
- In the Latin American plans of study, it was not possible to find evidence of subjects associated with Implantation Science, Information Sources and Scientific Evidence, as recommended by the SimpoDader 2016[13]. However, these could be incorporated in some of the micro-curricula. Besides, no available information was found about contents of social drivers of health, interculturality, dispensing to patients with special needs, interprofessional education, social pharmacy, and PhC for special populations[13].

In Latin America, Hospital Pharmacy has experienced a major growth in recent years[8]. However, postgraduate training is limited in most countries; additionally, no postgraduate training accreditation is required for the practice.

Accreditation is the tool used by High Education institutions in order to promote an improvement in the quality of education. Besides, it is an instrument that supports the quality of the institutions and the education programs offered. In the 9th Pan American Conference on Pharmaceutical Education, proposals were generated, and there was emphasis on the importance of accreditation for pharmacy degrees in Latin America[51]. This review detected that only 37.9% of universities, according to the information in their websites, offered accredited pharmacy programs. Therefore, this is a matter which requires more work oriented to meet this purpose.

Remote (virtual) teaching is used in some Latin American countries in order to meet the needs for training in High Education. However, in the pharmaceutical setting, similarly to other healthcare professions, it is necessary to remember the contribution by practice, face-to-face activity, and interaction of students with patients, institutions, and other healthcare professionals, as drivers for the development of healthcare skills.

The use of active teaching-learning methods promotes the training of students who are able to solve problems, and are responsible and committed with their humanistic training[20]. Equally, the use of the Participative Action-Research shows the need to train students and Pharmacy professionals regarding the know-how with social function[28]. As well as offering education with enterprising spirit and motivated by learning and re-learning, this strategy contributes to training Pharmacists who are responsible with their profession and their own lives[28]. In this context, identifying ways of learning can be used to define better strategies in the teaching-learning process, thus promoting the acquisition of professional skills by High Education students.

Recommendations

The training process in the healthcare area must be oriented towards meeting the needs of health systems and patients. In this sense, internship programs are the most common strategy in order to link education with health systems[25]. Besides, there is a need to generate and implement curricular guidelines that will strengthen the development of patient care skills in Pharmacy programs[25]. Overall, the majority of Pharmacists in Latin America need to be prepared for the changes demanded by PhC practice. For this, universities play a major role in the development of the profession and its practice[52]. Additionally, success cases in PhC teaching could be extrapolated to other Latin American countries.

In general, clinical training of the Pharmacist at graduate level seems to be limited; therefore, specialization is seen as an option in order to improve pharmacist performance in the patient care area. In this sense, specialized training for Pharmacists must include real clinical practice, strengthening skills and the confidence by Pharmacists in order to interact with patients and other health professionals, effectively contributing to achieve better health results. However, the offer must be improved in the Latin American context, because only 16.3% of the 146 pharmacy programs accessed on-line have this type of continuous training. In this sense, despite the advances and developments in PhC research, particularly in Brazil and Chile[47], it is necessary to work in order to strengthen research and the visibility of the results achieved with this practice[53,54], which should be promoted by a higher post-graduate training.

University training in graduate and postgraduate pharmacy must continue with the accreditation and re-accreditation processes, as a way of continuous improvement. Additionally, it is necessary to generate more options for postgraduate training on PhC. For this aim, universities must

Table 2. Perspectives in Pharmaceutical Care training in Latin America, according to the third Workshop-Conference of the Forum for Pharmaceutical Care in Community Pharmacy (PhC-CP Forum)[13]

Perspectives
To include in the plans of study, and in a transversal manner, curricular practices that allow an early interaction of students with patient care reality.
To use the information and communication technologies in Pharmaceutical services, allowing to provide care to vulnerable populations, and to improve the interaction with patients who are increasingly accessing this technology.
To incorporate within the contents of those subjects oriented to communication and development of social skills, subjects such as interculturality, interprofessional education, communication and interaction skills with vulnerable populations and overall patients.
To improve the offers for continuous education on PhC for Oncology, Hematology, transplants, autoimmune conditions, Pediatrics, Dermatology, and Palliative Care, among others.

PhC: Pharmaceutical care.

Table 3. Recommendations for incorporating pharmaceutical care teaching to practice

Recommendations
To conduct rotations of trainee students around different hospital units.
To assign tutors who are in the practice site and can interact directly with students in rotation.
To assign a challenge to be overcome by the student during rotations.
To promote the process of research in PhC since the first semesters.
To encourage the publication of clinical cases found by students during pharmacotherapeutic follow-up, supported by the healthcare team of the institution.

PhC: Pharmaceutical care.

achieve coordination with the needs of health institutions. Besides, it is necessary to associate qualified professionals with practical experience, who will enable said connection and, therefore, the generation of projects targeted to identify and use solutions to the problems of patients and the health system.

On the other hand, in Latin America it is necessary to connect training with the statements in the forum for PhC teaching in university, held in Spain: 2016 International SimpoDader[13], which highlighted the need to structure educational plans with contents of direct application on patients, encouraging an early contact of students with patient care reality. In this sense, there is a specific proposal by consensus about the minimum contents for PhC teaching[55]. Table 3 describes some recommendations targeted to promote the incorporation of PhC teaching to practice:

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Conflict of interests

No conflicts of interest.

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