How interprofessional education is offered to pharmacists and pharmacy students: a scoping review

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This study presents a review of recent published experiences of Interprofessional Education (IPE) in pharmacy education, aiming to identify the educational, institutional, and systemic factors involved in their development. Six databases were searched. The 147 (100%) articles included described experiences of IPE involving pharmacists or pharmacy students. The activities were concentrated in undergraduate courses (n=118, 80,27%). Forty-three experiences were referred to as pilot projects. Of all the experiences, 46 (31,29%) involved real patients. Most studies report very little information regarding organizational factors; 24 (16,33%) reported the curricular or mandatory nature of IPE experiences and 35 (23,81%) cited the existence of some type of funding dedicated to the development of the IPE. Barriers and facilitators to the development of IPE in the schools/universities were described and discussed. Many articles refer to the relationship between the IPE activities and the context, considering specific health needs, demographic conditions, health and education policies that demand IPE. The results indicate a great variety of IPE offered to pharmacy students. However, there are still gaps in the institutionalization of IPE in pharmacy education, with limited forms of support.

Keywords: Interprofessional education, Interprofessional collaboration, pharmacy

Introduction

Interest in Interprofessional Education (IPE) in pharmacy has been driven by the shift in focus on the professional practice goal: from dispensing medicines as stand-alone products to providing pharmaceutical and healthcare services alongside and in collaboration with other healthcare professionals.

This scenario demands graduates to be prepared to engage in a collaborative workforce. To ensure graduates are skilled and equipped for interprofessional collaboration, intentional IPE activities are necessary in their educational training.

However, IPE implementation can be challenging, requiring investment and planning from institutions and colleges to overcome the barriers of breaking down professional boundaries and established behaviors. There are few analyses of published research in pharmacy education (Olsen et al., 2021). However, there is a need to identify and analyze current initiatives and educational experiences in IPE in pharmacy around the world.

This study reviewed recent published experiences of IPE in pharmacy education, aiming to identify the educational, institutional/organizational, as well as systemic factors involved in the development of such activities.

Background

Since its inception, the professional role of the pharmacist has focused mainly on the formulation of medicines and dispensing of prescriptions. As a consequence, the training of pharmacists was directed towards pharmacology, preparation of pharmaceutical products and pharmaceutical chemistry until the 1990's (Rawlins et al., 1991). Historically, pharmacists have tended to work in isolation from other healthcare professionals (Bradley et al., 2008).

Today, a majority of products are industrially manufactured, pre-packed medicines with much less need for pharmacy compounding. Further, the number of available medications continues to grow, resulting in patients having increased number of prescriptions and more

complex medication therapies. The pharmacist's medication expertise is essential in avoiding drug interactions, minimizing adverse effects, and optimizing therapy choices for patients. The need for pharmacists to take on a more clinical role has become evident, including the provision of health promotion services, as well as clinical services and health advice (Bradley et al., 2008; Nakamura et al., 2014). This shift from only dispensing the product to more broadly tending to patients' medication needs has led pharmacists to be an integral professional in healthcare teams as the use of medicines is an interprofessional activity.

In this context, health organizations have stated that interprofessional collaboration (IPC), including pharmacists, is a crucial part of the challenge of achieving optimal health outcomes in increasingly complex health contexts. Pharmaceutical professional bodies have firmly embraced this aim and have developed policies, guidelines and advocated for the role of pharmacists in healthcare teams (FIP, 2020; FIP, 2016). The International Pharmaceutical Federation asserted that the future of pharmaceutical education requires enhancement of professional standard worldwide, and stated that "pharmacists should learn to work collaboratively with other health care professionals and scientists in medical, scientific and social fields" (FIP, 2017, p.21).

Nonetheless, the integration of pharmacists as healthcare partners in IPC is challenging and a number of barriers have been described. Separate physical locations prevent their integration, as the majority of pharmacists in the community are working in isolated facilities (Jenkins et al., 2016). Moreover, attitudes and lack of understanding of roles among the different healthcare professionals has also been identified as a barrier to IPC. The development of trust-based interprofessional relationship encompassing such things as goodwill, continuity of staff and co-operation in place are important steps for improvement (Bradley et al., 2008; Nakamura & Leite, 2015). These findings also reveal the need for IPE as a fundamental strategy to overcome the barriers contributing to interprofessional collaboration in practice.

The International Pharmaceutical Federation searched for examples of experiences in

IPE in pharmacy around the world and emphasized the diversity of initiatives that could be found, such as collaboration between professional bodies, universities, accreditation agencies, students and faculty (FIP, 2015).

Recently, Olsen et al. (2021) described published research of IPE in pharmacy, such as the research methods and bibliometric aspects. They found an increasing number of research on IPE in pharmacy after 2013. Olson & Bialocerkowski (2014) found that most of the studies carried out on IPE are focused on understanding its development in medical and nursing courses. In addition, since the scope of activities of the professions differs considerably, these studies are not considered transferable to understand other professional training courses, such as pharmacy.

Implementation of IPE faces many challenges, therefore Poirier (2016) suggests colleges and schools should start small and look for opportunities where others are seeking collaborations. Brazeau (2013) states that, to achieve the desired vision of educating students to work effectively in a patient-centered, collaborative team setting, interprofessional education requires sustained dedication and commitment. This study examines different aspects of IPE activities in pharmacy education published in recent years, highlighting barriers, facilitators, and opportunities in offering IPE activities.

Methods

A scoping review of the literature was conducted according to Arksey and O'Malley (2005) 5-step methodology and the guidance for scoping reviews from the Joanna Briggs Institute (Peters et al., 2015). This type of review aims to map and summarize the main evidence on a topic.

Step 1: identifying the research question

First, the following guiding question was defined: how are interprofessional education experiences involving pharmacists and pharmacy students developed around the world? Based

on this question, the inclusion and exclusion criteria were defined.

Step 2: identifying relevant studies

The search strategies was designed in consultation with a specialist in Universidade Federal de Santa Catarina library. The first author conducted run the search strategy protocol in February 2019 (Table 1). The selection of studies at each stage for inclusion/exclusion was performed by two researchers that reviewed a selection of articles independently in Mendeley Desktop. Any doubts were settled in discussion with a third researcher until they reached a consensus.

Six databases were used: Scopus, Medical Literature onLine (MEDLINE), Scientific Electronic Library Online (SciELO), Latin American and Caribbean Literature (LILACS), Eric, and EricProquest. These databases were chosen because they cover studies in health sciences and education. The search strategy was based on Health Science Descriptors (DeCS), Medical Subject Headings (MeSH) and key words frequently used in reviews on the subject, identified by prior reading.

Table 1: Search strategies

Database	Search Strategies	Limits
MEDLINE	"Interprofessional education"[Title/Abstract] AND ("Pharmacy"[Majr] OR "Education, Pharmacy"[Mesh] OR "Pharmacy"[Title/Abstract] OR "Pharmacists"[Mesh] OR "Pharmacist"[Title/Abstract]) AND (("2014/01/01"[PDAT]: "2019/02/28"[PDAT]) AND (English[lang] OR Portuguese[lang] OR Spanish[lang]))	Included in the search strategy
SciELO	("Interprofessional education" OR "Educação interprofissional" OR "Educación interprofesional") AND (pharmacy OR pharmacists OR pharmaceutical OR Farmacia OR Farmácia OR Farmacéuticos OR Farmacêuticos OR Farmacêutica)	Publication years: 2019, 2018, 2017, 2016, 2015, 2014
Scopus	(TITLE-ABS-KEY ("Interprofessional education") AND TITLE-ABS-KEY (pharmac*)) AND (LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014)) AND (LIMIT-TO (LANGUAGE, "English") OR LIMIT-TO (LANGUAGE, "Spanish"))	Included in the search strategy
LILACS	("Interprofessional education" OR "Educação interprofissional" OR "Educación interprofesional") AND (pharmacy OR pharmacists OR pharmaceutical OR Farmacia OR Farmácia OR Farmacéuticos OR Farmacêuticos OR Farmacêutica)	Publication years: 2019, 2018, 2017, 2016, 2015, 2014
Eric	noft("Interprofessional education") AND noft(pharmac*)	Date: 1-1-2014 a 28-2-2019
Eric ProQuest	("Interprofessional education") AND (pharmacy OR pharmacists OR pharmaceutical)	Date: 5 years

Step 3: study selection

Articles published in English, Portuguese and Spanish in 2014-2019 were included. They described experiences of interprofessional education involving pharmacists or pharmacy students and one or more students from other professional backgrounds. We chose to include studies published within the 5-year period to identify the most current experiences.

Hammick et al. (2007) report that even though it is a subset of multiprofessional education (in which members or students learn side by side), interprofessional education requires an interactive element in the learning experience. Therefore, we decided to follow the methodology by Hammick et al. (2007) that excludes articles describing experiences in which

members of different professions only share the same environment, without reflective interaction with each other or participation in decision making. These were excluded considering that this will not lead to interprofessional learning.

Initially, 588 studies were found. Of these, 215 studies were excluded for being duplicates. Of the 373 studies that remained for the analysis of titles and abstracts, 117 were excluded by the exclusion criteria. 147 studies were retained for the scoping review. The search and selection process of the studies in this review is presented in Figure 1. The list of references of the articles selected for review are in Appendix A.

Step 4: charting the data

The processing for charting data was performed by two researchers independently and discrepancies discussed with a third researcher until consensus was reached.

The conceptual framework "Interprofessional Education for Collaborative Patient-Centered Practice" developed by D'amour and Oandasan (2005) can be used to identify the processes and determinants involved in educational settings that perform IPE. For this review, an adaptation of the original framework was used to extract thematic categories that allow us to qualitatively synthesize the data and characterize the experiences in order to answer the guiding question.

The articles were analyzed to extract the following information:

- Educational factors (micro level): objective, method, degree level of pharmacists or pharmacy students involved, modality, number of participants, other professional categories involved, workload, setting, supervision, faculty development;
- Organizational factors (meso level): information regarding the existence of leadership, institutional policies, resources;
- Systemic factors (macro level): information related to health, education or other policies or other information related to the regional context where the experience is located.

To analyze the objectives, we used the categories of formal and informal interprofessional education developed by Freeth et al's. (2008). Formal IPE aims to promote collaboration and improve the quality of care. Therefore, it is developed to achieve interprofessional collaboration as its explicit goal. In informal IPE, the competency of interprofessional collaboration is not an explicit goal, however, its development can be identified throughout the educational activity.

Reeves' (2016) concept was used for analysis of the education methods category but with the following modification: when it comes to mixed-method, it was opted for experiences that used any combined methodologies, not only e-learning and face-to-face, for these cases, it was considered the term 'mixed modality'.

For the meso level analysis, the reports brought by the selected articles were divided into hindering and facilitating factors for the development of the IPE activities described, since several articles categorized the organizational factors in this way.

At the macro level, quotes were identified in the articles that described how the authors situated the development of IPE activities in the political, economic, and health (national/regional/local) scenario. These accounts were analyzed and categorized.

Step 5: collating, summarizing and reporting the results

The extracted data were organized in an Excel table and interpreted according to the guiding question in order to identify how interprofessional education experiences involving pharmacists and pharmacy students are developed around the world, using the conceptual framework "Interprofessional Education for Collaborative Patient-Centered Practice" as a guide (D'amour and Oandasan, 2005).

Results

All studies included in this review (n=147, 100%) were published and/or available in the period from 2014 to 2019 (see Table 2).

The activities mostly took place in the United States (n=85, 57,82%). Of the total number of articles, 108 (73,47%) were developed by or in collaboration with members of pharmacy faculty or equivalent.

Table 2: Profile of studies (n=147, 100%)

Category	Nº (%)
Year	
2014	15 (10,20)
2015	19 (12,92)
2016	25 (17)
2017	29 (19,72)
2018	43 (29,25)
Country	
United States	85 (57,82)
United Kingdom	8 (5,44)
Canada	6 (4,08)
Qatar	5 (3,40)
Australia	4 (2,72)
New Zealand	4 (2,72)
Lebanon	2 (1,30)
South Africa	1 (0,68)
Germany	1 (0,68)
Brazil	1 (0,68)
China	1 (0,68)
Ecuador	1 (0,68)
Spain	1 (0,68)
Guatemala	1 (0,68)
Indonesia	1 (0,68)
Iran	1 (0,68)
Ireland	1 (0,68)
Norway	1 (0,68)
Switzerland	1 (0,68)
Japan	1 (0,68)
Collaboration between countries	1 (0,68)

Educational factors (Micro level)

Table 3 describes the results related to the educational factors of the analyzed experiences. The most used method was practice-based clinical placement learning (nursing home care, street population care, medication review in home visits, clinical rotations, among others) (n=39, 26,53%), followed by simulation-based learning (n=37, 25,17%) and mixed methods (n=36,

24,49%). Of all the experiences, 46 (31,29%) involved real patients.

Most of the experiences were face-to-face (n=124, 84,35%), at the university itself (n=53, 36,05%), or at an outpatient clinic, hospital, or clinic (n=33, 22,45%).

Nineteen (12,92%) articles reported only clinical objectives. Another 42 (28,57%) articles had the sole aim of enhancing skills needed for interprofessional collaboration. Still another 42 (28,57%) articles reported mixed objectives (clinical and interprofessional skills). Therefore, there are 19 (12,92%) informal experiences, as they disregard the development of interprofessional competencies as a goal to be achieved, and 84 (57,14%) formal experiences. Eight (5,44%) experiences reported to have drawn on the domains and competencies contained in the Interprofessional Education Collaborative Expert Panel (2011).

The activities developed were concentrated in pre-licensure courses (professional programs), had pre-licensed students as target audience (n=118, 80,27%), were followed by teams of pre-licensed students and licensed pharmacists (n=22, 14,97%) and 7 (4,76%) were for licensed pharmacists only. The disciplines or professions that participated in the experiences along with pharmacy were mostly medicine (n=106, 72,11%) and nursing (n=102, 69,39%).

The number of participants and the reported workload was highly variable among the articles. The activities reported in this review mostly adopted supervision or facilitation of the experiences (n=111, 75,51%). Only 1 (0,68%) article reported that "students were advised that they were required to work as autonomous professionals during the simulation, and that mentors/facilitators were not available" (Roberts & Goodhand, 2018, p.109). The professionals responsible for supervision were mostly professors (n=89, 60,54%). Other professionals cited included: clinical faculty members or preceptors, researchers, health services professionals.

Nineteen (12,92%) articles reported some type of faculty development. Among the methods used for faculty development were: workshops, formal courses, educational/guide materials and lecture (El- Awaisi et al., 2017; Sherwood et al., 2019). Two articles reported (1,36%) that any formal instructor training was offered. Patel et al highlight that training

instructors "*may improve the learning experience in the future*." (Patel et al., 2018, p.992).

Table 3: Educational factors (Micro level)

Category	Nº (%)
Method	
Practice-based clinical placement learning[a]	39 (26,53)
Mixed methods[b]	36 (24,48)
Simulation-based learning[c]	37 (25,17)
Problem-based learning[d]	23 (15,64)
Seminar-based learning[e]	12 (8,16)
Type	
Face-to-face activities	124 (84,35)
Blended[f]	12 (8,16)
E-learning[g]	10 (6,80)
Scenario	
University, classroom	53 (36,05)
Outpatient/hospital/clinic	33 (22,44)
Community	25 (17,00)
Mixed scenario[h]	16 (10,88)
Online	9 (6,12)
Simulated settings	6 (4,08)
by phone	1 (0,68)
Goals	
Formal[i]	84 (57,14)
Informal[j]	19 (12,92)
Educational level of the participants	
Pre-licensure students	118 (80,27)
Multilevel[k]	22 (14,96)
Licensed Pharmacist	7 (4,76)
Number of participants	
Minimum	6 participants
Maximum	7251 participants
Average number of participants	282,03 participants
Workload	
Minimum	45 minutes
Maximum	3 years
Participating Professions or disciplines	
Medicine	106 (72,10)
Nurse	102 (69,38)
Physiotherapy	40 (27,21)
Social work	34 (23,12)
Dentistry	26 (17,68)
Nutrition	23 (15,64)
Occupational therapy	21 (14,28)
Sanitation specialist	8 (5,44)
Radiology	5 (3,40)
Speech Therapy	7 (4,76)
Psychology	6 (4,08)
Supervision	
Professors	89 (60,54)
Other professionals[l]	22 (14,96)
Faculty training[m]	
Yes	19 (12,92)
No	2 (1,36)

[a] Development of knowledge in practice-based settings which involve experiential learning
[b] Combining two or more methods
[c] Experience of working on a usually simplified simulated world or system

[d] Method in which complex real-world problems are used as the vehicle to promote student learning of concepts and principles as opposed to direct presentation of facts and concepts
[e] Teaching model in which students work in small groups to discuss assigned questions and issues under the guidance of teachers
[f] Face-to-face and e-learning activities
[g] On-line activities
[h] Combining two or more scenarios
[i] When explicit planning of IPE occurs
[j] When IPE occurs in the process of another planned activity
[k] Pre-licensure students and licensed pharmacists
[l]Clinical faculty members or preceptors, researchers, health services professionals

Institutional factors (Meso level)

A summary of the results of this level can be seen in Table 4. It is noteworthy that most studies report very little information regarding organizational factors related to the development of IPE activities. Among them, 24 (16,33%) reported the curricular or mandatory nature of IPE experiences, and 12 (8,16%) experiences are reported as being only elective. IPE experiences are regular curriculum activity for only some professional programs. Forty-three (29,25%) experiences referred to as pilot projects were identified.

Of the total number of studies, 35 (23,81%) cited the existence of some type of funding dedicated to the development of the IPE experience. In 59 (40,14%) articles the authors reported there was one or more formal leaders in the institution responsible for the development and implementation of IPE, and in most cases the leadership was exercised by a group of professors.

Table 4: Institutional factors (Meso level)

Category	Nº (%)
Courses	
Elective	12 (8,16)
Curricular	24 (16,32)
Mixed	9 (6,12)
Not mentioned	102 (69,38)
Leadership	
Interprofessional Education team[a]	7 (4,76)
One Professor	1 (0,68)
A group of professors	36 (24,48)
A team of professors and clinical leaders	10 (6,80)
Clinical Leaders	5 (3,40)
Not mentioned	88 (59,86)

[a]Team formally established to address interprofessional education

The studies that reported organizational factors in the development of IPE activities, identified factors that hindered or facilitated the process, described in Table 5. They were listed in barriers and facilities in this review, since most articles categorized them this way.

The barriers that appeared most frequently in this review were related to the faculty workload and, in many cases, there was no incentive on the part of universities, causing interested faculty members to participate as volunteers. However, resistance to change on the part of faculty members is also reported as a barrier.

The need to formulate a common schedule for the different courses and the lack of physical space was also recognized by the authors as barriers in the process of implementation of IPE.

Among the facilitating factors, institutional support to the professors and physical space, are issues mentioned. Other potentialities brought by the articles was the autonomy of courses and the existence of a specific team or committee to plan and execute activities.

Table 5: Barriers and Facilitators related to institutional factors reported by authors

Barriers	Time consuming and no dedicated payment	"The IPE pilot took around 18 months to develop (as it was secondary to core tutor and clinical work), and was undertaken in the tutors' spare time." (Mckinlay et al., 2019, p.520)
		"As is the case in many university settings, there were no incentives (e.g., course release or overload pay) for faculty to assume additional responsibilities related to IPE." (Parker et al., 2015, p.116).
		"This resource is a feasible interprofessional small-group activity that has been implemented without excessive faculty time or institutional resources." (Richmond et al., 2017, p.1)
		"A number of challenges were encountered, including limited protected time for faculty, residents, clinical simulation educators, and staff." (Crawford et al., 2019, p.70)
		"This is a challenge as there is no budget to compensate for the time faculty dedicate to the programme; because it is co-curricular it is not factored into their teaching workload." (Farra et al., 2018, p.915)
	Common schedule	"This activity presented several challenges for implementation. The first was that the three disciplines involved were from different institutions, so finding a common time for students on clinical rotations to meet for a simulation activity was difficult. We scheduled the session dates 6-12 months in advance. Due to differences in the school calendars, we occasionally had sessions with only two disciplines, thereby changing the nature of the encounter and the insights gained by the students." (Kurnoor et al., 2019, p.8)
		"Challenges were primarily logistical and included scheduling among disciplines, scheduling with community partner (i.e., weekly appointment reminders, scheduling around other facility events), coordination of program advertising with community partner, and space availability at screening site." (Kurowski-Burt et al., 2017, p.3)
	Physical space	"Physical space constraints were an impediment to workflow to a moderate degree and should be considered in selecting clinical spaces and design." (Castro et al., 2019, p.52)
		"Our findings also provide evidence of ways to enhance learner experiences. We found that the physical environment can interfere with learning, which may detract from the focus of the learning experience. […] When developing IPE courses, it is imperative that physical space and personnel requirements are sufficient to provide an optimal learning environment." (Rotz et al., 2015, p.309)
	Educators reluctance to change	"The anticipated obstacles were timetabling, faculty buy-in, varying student cohort sizes, physical and human resource limitations, and reluctance of some educators to change current educational practices." (Alinier et al., 2014, p.207)
Facilitators	Support from the University	"Institutional support is exemplified by faculty and administration investing significant financial and other resources into mini-course delivery, and by the IPE facilitator teams leading the live event." (Amerongen et al., 2015, p.572)
		"Development of the IPE programme by the IPE workgroup was also included in the University's strategic plan, which substantiated the value and commitment of LAU leaders to IPE." (Farra et al., 2018, p.915)
		"Some continuing practical support plus encouragement was provided by the university with a small grant awarded for direct and evaluation costs." (Mckinlay et al., 2019, p.520)
		"The piloting and development of this new IPE simulation strategy was a part of an institutional vision and happened in parallel with the construction of a larger and purpose-built clinical simulation center to better accommodate the large number of health care students and the anticipated increase in simulation activities across a range of professions within the University." (Alinier et al., 2014, p.207)

		"The commitment of leadership from the health science schools was essential to allow for successful development of this large-scale course. In addition to providing staff support [...] leadership agreed on several fundamental principles: offer the class at a set time in the schedule across programs; provide two faculty to teach from each school; provide sufficient teaching space; and, ensure a minimum number of enrolled students from each unit." (Sweet et al., 2017, p.16)
		"Initially, the activity was funded by a grant, but once the grant funding ended, the medical school provided funds for use of the simulation lab and the SPs. Lastly, we required sufficient trained faculty, at least two per discipline, so that one could participate in the debriefing each month." (Kurnoor et al., 2019, p.8)
	Autonomy	"As opposed to one overarching academic policy for students from all participating health professions, IPE faculty chose to allow each individual program to determine the best method for integrating this IPE course into their program's curriculum. Allowing participating professions to identify the best way to incorporate IPE avoided formation of new academic-credit-courses at that time, which could have delayed program implementation with procedural approvals for new courses by all participating professions' governing bodies." (Peeters et al., 2017, p.1101).
	Interprofessional Leadership	"Recently, a multi campus Qatar IPE Committee has been formalized to plan the systematic delivery of future IPE activities across different professional years among these and other domestic curricula. Not only will this group work to incorporate additional expanded combinations of disciplines in IPE activities (such as nutrition, respiratory therapy, and medicine), but also guide collaboration of patient case writing and coordinate IPE professional development opportunities for facilitating faculty members." (Wilbur et al., 2015, p.164)
		"The committee, which quickly expanded from 5 members representing 5 schools and colleges in 2011 to more than 20 in 2014, was tasked to facilitate and deliver IPE learning and service opportunities to students from these colleges." (Addy et al., 2015, p.106)
		"The University of New England established its own Interprofessional Education Collaborative (UNE IPEC) in 2010, following over a decade of experience in developing and implementing interprofessional education and training involving more than a dozen health professions. UNE IPEC has since developed a range of interprofessional education, training, and clinical programming, including student-led mini-grants, team immersion experiences, clinical simulation, service learning, honors distinction for graduating students, faculty development, and clinical education sites." (Sherwood et al., 2019, p.828)
	Shared goals and vision	"Curricular goals and objectives for the pharmacy and dental students were agreed upon by pharmacy and dental faculty prior to implementation, and were linked to the four core competencies of interprofessional collaboration as defined by the Interprofessional Education Collaborative (IPEC)." (Theodorou et al., 2018, p.677)
		"Developing the interprofessional module required faculty to explore best practices for collaborative learning. Faculty developed module objectives and reviewed their respective courses to ensure consistency with nursing and pharmacy course objectives. Faculty responsibilities related to the new joint activity were negotiated. As planning began, the faculty dialogued about the personal attributes needed by student team members in order to be a good team citizen." (Schaffer et al., 2015, p.e12)
		"Faculty-facilitated weekly reflection sessions helped assess student reactions to their experiences and what they learned [...]." (Arndell et al., 2014, p.101)
		"Faculty designing the course met regularly to standardize the teaching approach and design the teaching materials." (Sweet et al., 2017, p.16)
		"The HMP curriculum team [...] meets monthly to approve content, review course evaluations, address logistics, build on lessons learned, and share successes." (Arenson et al., 2015, p.139)

		"Referring community practice partners huddle weekly with the faculty-in-residence and students to review and update plans [...]." (Bradley et al., 2018, p.3)
		"Representative faculty leaders should meet at least a month in advance and again a week prior to the event to review teaching materials and discuss logistics and teaching responsibilities." (Gill et al., 2017, p.3);
		"Faculty mentor discussion via informal meetings after each weekly session and scheduled team meetings revealed areas of project success and those of difficulty or in need of improvement." (Kurowski-Burt et al., 2017, p.3)
	Reflexion and debriefing	"Learning objectives were addressed during debriefing periods that occurred immediately following each scenario, as well as a large group debriefing which followed the last round of scenarios." (Motycka et al., 2018, p.4);
		"Observers (the other team) were requested to write their comments on a white board during the scenario, so their points could be discussed after the debriefing, which is a key phase of any scenario-based simulation session." (Alinier et al., 2014, p.211)

Systemic factors (Macro level)

From the authors who mention the systemic factors (85 articles, 57,82%) we see the perception of how interprofessional experiences are anchored in health or education policies and how they are connected to the loco regional health contexts (see Table 6). This connection has, in general, a perspective that the IPE will reflect in better health practices and in better meeting the health needs or policies of that region. The existence of incentives, sometimes financial, for these activities to take place, deserves to be highlighted.

In the articles it can also be observed the influence of regulatory bodies of health and education in the IPE implementation, by redefining the scope of professional practices and responsibilities, and corroborating the interprofessional practices in the health services. The changes in the organization of the health system were also recognized by some authors as an important motivation for the implementation of interprofessional education experiences.

Besides the efforts of the health system to introduce interprofessional collaboration, barriers to the implementation of IPE were reported in the educational system side, particularly the scarcity of experiences and evaluations of them.

Table 6: Systemic factors (Macro level)

Health systems and providers incentives IPE as a tool to meet the health needs.	"NHS England set up funding to support new working practices of pharmacists and pharmacy services in a wider range of care settings, for example general practitioner (GP) practices, care homes and domiciliary care to support people with long-term conditions on multiple medicines." (Kayyali et al., 2019, p.295)
	"Due to the complexities of the current health-care model and with the growing demands of a diverse United States demographic, there is a great interest to prepare health-care professional students (i.e., pharmacy students and medical students) to work collaboratively and collectively in interprofessional team-based care. The Institute of Medicine Committee on Quality of Health Care in America recommends using a team-based approach to best address the complexities and demands that afflict our current fragmented health-care system." (Vinluan et al., 2018, p.298)
	"To address local challenges of health workforce shortages and a higher incidence of many chronic diseases than other parts of Australia, as well as those relating to work-readiness and the skill mix of graduates other than nursing and medicine, the Capricornia Allied Health Partnership (CAHP) was conceived. The result was an interprofessional chronic disease ambulatory clinic which focuses on early intervention for clients with multiple chronic diseases by embedding students into a service delivery model." (Frakes et al., 2014, p.573)
	"The recent "Aktionsplan des Bundesministeriums für Gesundheit zur Verbesserung der Arzneimitteltherapiesicherheit in Deutschland" (action plan of the Federal Ministry of Health for improving medication safety in Germany) recommends, among others, the use of electronic devices and strengthening of interprofessional communication as priority fields for applying strategies to improve safety of drug therapy." (Mahlknecht et al., 2017, p.31)
	"As healthcare delivery in the Middle Eastern region is transforming into team-based care and collaborative practice, it is important to ensure curricula throughout the health professions support this change and prepare students accordingly." (Wilby et al., 2015, p.83)
	"In New Zealand (NZ), health priorities include a focus on specific population needs, reducing health disparities and improving collaborative practice […]. In 2012, Health Workforce New Zealand, the branch of the Ministry of Health tasked with leading and supporting training and development of the health and disability workforce, provided funding for a new model of learning for health professional students." (Pelham et al., 2016, p.211)
	"The provision of healthcare close to communities where people live is central to the New Zealand Health Strategy, but there is a shortage of health professionals working in rural areas and within primary healthcare." (Darlow et al., 2018, p.2)
Influence from regulatory institutions and professional bodies.	"New standards for pharmacy professionals were launched in 2017 by the pharmacy regulator in Great Britain, the General Pharmaceutical Council, to ensure those using pharmacy services receive safe and effective care. Pharmacy education must ensure the profession can meet these standards which include providing person-centered care, working in partnership with others and communicating effectively, as well as maintaining the science base which underpins the profession." (Kayylia et al., 2019, p.295)
	"The curriculum of the faculty of medicine and other health professions education is based on a common reference, advocating the development of transferable skills such as collaborating and communicating […] In Switzerland, a new law about IPE professional proficiency will be registered soon for health and medical professions." (Meche et al., 2015, p.279)

	"The Institute Of Medicine (US) expanded its recommendation by asserting that "all health professionals should be educated to deliver patient-centered care as members of an interdisciplinary team, emphasizing evidence-based practice, quality improvement approaches, and informatics." Recently, the IOM described a developmental model for IPE in which educational activities are incorporated across three stages: foundational education, graduate education, and continuing professional development." (Lockeman et al., 2017, p.433)
	"The American Association of Colleges of Pharmacy (AACP) has recognized the need to expand opportunities for student pharmacists in global healthcare and also support and share work that is already being done." (Asal & Poyant, 2018, p.657)
	"In Australia, the national standards body for medical education, training and continuing professional development (CPD), the Australian Medical Council, requires a range of teaching and learning approaches, one of which is "working with interdisciplinary and interprofessional teams." (Van Driel et al., 2017, p.1)
The need to develop IPE experiences in the country or region and to evaluate existing experiences	"In Spain, different authors have suggested the introduction of IPE programs in our Universities. However, to our knowledge, only the Universidad Europea de Madrid is currently implementing one […]." (González-Pascual et al., 2018, p.374)
	"Few institutions, especially from the South African context, have reported on IPE in non-medical school health science faculties." (Reitsma et al., 2019, p.299)
	"Moreover, IPE is still an emerging trend in health education in the Middle East. Indeed, while some promising initiatives were recently reported in Qatar, the UAE and Egypt, IPE is not yet an integral part of health care curricula in the region." (Zeeni et al., 2016, p.166)
	"Although research on interprofessional education (IPE) has been reported extensively in the literature, there is limited integration of IPE into the health curricula of Indonesian universities. However, debate still remains as to the most appropriate types of IPE to be incorporated into the curricula to achieve the desired outcome." (Ernawati et al., 2015, p. 398).
	"Interprofessional education in the Middle East is rapidly developing. […] However, there is little knowledge of programmes that integrate interprofessional education across an entire course or semester. […] Furthermore, interprofessional training has been shown to foster positive attitudes towards interprofessional communication, yet this has not been evaluated in a Middle Eastern context." (Wilby et al., 2016, p.542)
	"In China, interprofessional communication, as an important aspect of modern medical care, has been encouraged in clinical practice, and has started attracting attention in undergraduate healthcare education. However, current Chinese healthcare educational models focus on uniprofessional training, rather than on interprofessional learning. Effective implementation of IPE within health professions education requires new attitudes and innovative tools." (Wang et al., 2016, p.596)
	"Schools of Pharmacy in the UK have highlighted barriers to IPE implementation such as finding appropriate professional partners and coordinating timetabling." (Kayyalia, et al., 2019, p. 296)
	"Undergraduate medicine, nursing and pharmacy education are established in the North East of England, based at universities spread across a wide geographical area. Although all institutions deliver training around prescribing and therapeutics to these groups using a variety of teaching and learning strategies, interprofessional education is rare." (Hardisty et al., 2014, p.291)
	"Experiences are still scarce in Brazil and the barriers to its implementation are many, such as institutional resistance, from teachers and students, curricular barriers and corporatism." (Nuto et al., 2017, p.56)

	"In Australia [...] while many universities include IPE and interprofessional learning in their health and social care programmes, the content is general in nature; learning outcomes, including benefits to patients, are not formally assessed." (Van Driel et al., 2017, p.1)

Discussion

The pharmacist role is undergoing significant expansion in the last decade. The recent changes in pharmacists' roles and responsibilities include clinical care, medication management, screening for chronic disease, providing smoking cessation, providing vaccination, and others (Silvaggi et al 2017; Bryant et al 2017). Pharmacists have been integrated in general practice and pharmacies have been integrated to primary healthcare services in several countries. The need for better training for interprofessional collaboration is critical for pharmacists.

Following this trend, the inclusion of pharmacy in IPE experiences has been more common, and considerable growth in the number of publications describing IPE initiatives in pharmacy can be observed over the past few years. Noting that the search strategies were closed in February 2019, this topic is still growing steadily in terms of number of publications. The same was observed by Olsen et al., (2021) about research in IPE in pharmacy.

Medical and nursing students remain the main partners in IPE in pharmacy education, as described earlier by Barr et al. (2005) and Hammick et al. (2007). This more frequent approach to medical and nursing education may reflect the primary object of pharmacist's work: the use of medicines. This is a common topic to these three professions, directly related to their work processes, and therefore a primary subject for an interprofessional approach. In addition, Morbitzer et al. (2021) argue that these three disciplines may have more students taking part in these studies due to proximity and job responsibilities.

In 2005, Barr et al. concluded that IPE was more likely to occur in continuing education or postgraduate courses, in hospitals and clinical settings. In recent publications about pharmacy education, however, the majority of activities were developed in undergraduate and professional courses, mostly at university campuses (Table 3). So, it seems that IPE is becoming

an essential and basic learning objective in health professionals' initial training. In pharmacy education, IPE has the greatest potential to change attitudes, beliefs, knowledge, and collaborative skills. It is corroborated with the result of explicit aims of the activities as education for interprofessional collaboration. This is an advancement in the IPE strategic position within health professional training, in contrast to previous reports as in 2007, where Hammick et al. found that the majority of IPE activities did not promote IPE, but rather consisted of the students' learning about a clinical issue next to each focusing on the clinical problem without interprofessional interaction rather than learning to collaborate with each other in addressing a clinical problem.

IPE in postgraduate setting is also reported and has a greater potential to change organizational practice and patient care. Therefore, ideally, it is suggested that IPE should begin early in pharmacy education and extend throughout the professional career (Reeves, 2016; Barr et al., 2005). However, the present study also found reports of countries where IPE "is not included in the curricula of pharmacy and medical students" (Dabaghzadeh et al., 2017, p.104).

This review indicates a diversity of interprofessional education methods being offered to pharmacists and pharmacy students in conjunction with other health and social service professionals. There is no standardized format or program for teaching IPE and interprofessional teamwork skills in pharmacy education, but there are a variety of strategies reported in the literature (Morbitzer et al., 2021). Reeves (2016) identified in the literature the use of methods also found in the present study, such as seminars, problem-based learning and clinical practice.

Experiential learning activities did not occupy a prominent place among the reported activities. Despite being described as the most applied method in this review, it accounts for only a quarter of the developed experiments, and only 46 (31,29%) involved real patients. This is certainly a major weakness identified in IPE in pharmacy education. In fact, despite the potential benefits of integrating pharmacists in healthcare teams, the effective interprofessional

collaboration in pharmacy is recent and some important barriers are reported. Some significant barriers include resistance from other professionals (particularly physicians) to share medication management responsibilities and roles, lack of pharmacists' confidence in their ability to take this role, and lack of technologies that promote the integration (Bryant et al 2017; Mossialos et al 2015). Location is also a hurdle, as the majority of pharmaceutical services are provided in pharmacies, far from the other healthcare providers (Jenkins et al., 2016).

Tutoring interprofessional learning requires knowledge that goes beyond the knowledge required in uniprofessional learning, requiring the ability to understand and address the needs of different professional groups, which can range from perspectives of practice, language, status, barriers, history, and more (Howkins & Bray, 2008; Barr & Low, 2013). In their review, Hammick et al. (2007) reported that the ability of staff to facilitate learning is a key factor in the student experience, and staff training to ensure the skills and confidence needed for didactic supervision is an essential factor of successful IPE experiences. Therefore, only a small number of studies reported on the training of faculty to offer IPE. This is an important issue to be addressed in pharmacy schools. This is a particular concern in pharmacy, as it is traditionally a technical and isolated profession. Professors and preceptors in pharmacy were historically educated mostly to develop in-lab activities, or to manage medicines dispensation in pharmacies (an isolated type of health facility).

The analyzed articles report that most of the experiences occurred in face-to-face learning experiences. Although the potential of e-learning has already been advocated for some years as a viable alternative for institutions that encounter financial and logistical difficulties in implementing IPE (Shoemaker et al., 2014), the use of distance learning methods in pharmacy education, prior to the COVID-19 pandemic, was characterized as complementary to face-to-face activities, only (Lorenzoni et al., 2019). Certainly, the pandemic has driven the development of online IPE activities worldwide, bringing great challenges for enabling collaborative and joint learning, particularly in experiential learning. Some commentators have

already described opportunities for using e-learning both now and in the future (Khalili, 2020; Prasad et al., 2020).

The main characteristics of the educational activities described above (micro level) reflect the organizational conditions in which they are developed (meso level). Specifically, at this level, the framework adapted from D'amour & Oandasan (2005) reveals some factors that indicate the internal policies of higher education institutions towards the institutionalization of IPE. Importantly, only a small number of articles report organizational factors in describing IPE activities, such as the existence of leadership responsible for mobilizing the resources and designing the agenda, existence of financial incentives, logistics, and institutional policies. Therefore, it is not possible to identify, for most studies, what the institutional conditions are for the development of IPE.

Regular, curricular provision of didactic experiences specifically designed to develop the competencies for interprofessional collaboration is certainly a critical factor for the professions to achieve an adequate level of training. Sustainable and widespread changes in healthcare practices cannot occur with only isolated initiatives, but from the normalization of a new pattern of professional practice for which everyone is sufficiently prepared. In this sense, Ceccim (2018) emphasizes the importance of implementing non-optional experiences in the curriculum, since optional experiences will only reach the students most sensitive to change and already predisposed to collaboration. The existence of mandatory IPE in the professional program could be a key indicator of institutionalization of IPE in pharmacy education.

The institutionalization of IPE in universities can also be observed by IPE- dedicated leadership teams, which are still uncommon in healthcare schools. Only 7 studies reported the existence of a dedicated academic leadership in IPE.

D'amour et al. (2008), suggests that one of the resources for adequate interprofessional collaboration is the sharing of common goals and visions among teams and that divergences and diverse expectations regarding collaboration are acknowledged. Considering Freire's

(1996) assumptions, educational activities need to be meaningful for students, i.e., appropriate for the intended audience, taking into account their experiences and expectations, and assuming a dynamic character and developing autonomy. Since IPE requires the exercise of interprofessional collaboration, this can be considered as a potentiality for the realization of IPE activities, as described by Sweet et al. (2017).

The existence of funding was described in some of the studies and is identified as an important barrier, particularly for the funding of faculty workloads. In this situation, many of the experiences described were carried out as voluntary work by faculty. This issue is of special interest, since the preparation of intercourse activities is always time-consuming, because there are difficulties in organizing common calendars, adequate physical spaces, and resistance from teachers and students to engagement. Institutional support is therefore a decisive factor to be considered (Buring et al., 2009). Universities have a great responsibility for achieving the desired new pattern of collaborative practice and interprofessionalism in healthcare.

Universities, in turn, navigate the landscape of social demands and guidelines (explicit or implicit) from the healthcare system, the education system, and local governments. D'amour and Oandasan (2005) paid attention to the importance of the national/regional scenario to the development of sustainable and meaningful IPE in healthcare.

Targeted efforts that challenge the prevailing views and norms that act as barriers to IPE and are able to create a shared vision of health and education systems that would be in line with interprofessionalism are needed, especially if they are at the policy and regulatory level. Professional leadership and regulatory bodies may also represent the type of force that helps facilitate this type of change, as they are responsible for defining the scope of professional practices and responsibilities (D'amour & Oandasan, 2005; Ginsburg & Tregunno, 2005).

The small amount of information on the macro level (specifying health and education policies and regulations) reported in the studies reviewed here is a point to be highlighted. This may indicate, on the one hand, a lack of clear policies that support IPE or, on the other hand,

little understanding by the respective authors of the importance of developing and evaluating IPE activities in the context in which they are offered.

In the analyzed articles, some influence of health and education regulatory bodies on the provision of IPE by universities can be observed. Professional bodies play an important role in overcoming barriers in the professions and fostering cultural change, as it helps institutions overcome difficulties that would not have been anticipated and facilitates the implementation of innovations (Buring et al., 2009). Healthcare systems, on the other hand, have the power to influence the education of healthcare professionals directly or indirectly, but with great impact. Actions of healthcare systems and agencies responsible for the organization of healthcare services, such as those described in the publications, can create the specific demands that will define the creation of jobs for interprofessional teams, specialized services with interprofessional care, or the specific incentive for the hiring of pharmacists by general practices (as has happened in England) (Anderson & Sharma, 2020).

The education system can even more directly influence establishing competencies for interprofessional collaboration in the professional and educational standards, as it already happens in several countries. At the international level, the International Pharmaceutical Federation has acted strongly in this direction, publishing guidelines, promoting the topic, and encouraging pharmaceutical institutions around the world to advocate for IPE in their countries (FIP, 2017).

Conclusion

Due to the large number of analyzed publications in this review (n=147, 100%), a great heterogeneity of descriptions of IPE activities was observed. However, the large number of eligible studies represents a positive result, that we are creating references and experiences of IPE in pharmacy, even if very concentrated in only a few countries.

The analyzed studies focus their descriptions on the micro level, that is, on educational

activities. The results indicate that there are still weaknesses in the institutionalization of IPE including pharmacists and pharmacy students in universities, with limited forms of support. Many of the activities described are pilots, with low workload or are not offered regularly, which limits their ability to produce results of greater impact on health practices.

To summarize, at the micro level, each IPE activity developed needs to be adequately planned to provide meaningful learning and prepare students to act collaboratively; at the meso level, educational institutions need to invest in the effective institutionalization of IPE at the macro level, it is imperative that governments and professional and educational leadership entities define clear incentive, regulation, and support policies so that health practices and health professional education can be established based on interprofessionalism. Otherwise, the impact capacity of IPE activities developed in isolation, without organizational and political support, will be reduced and changes in practice will only occur very long term.

Evidence indicates that no future professional will work alone, in any practice setting. The pharmacist, despite their tradition as a professional physically and professionally distant from other professionals, will have to understand the broad healthcare sector, communicate and collaborate with other healthcare professionals. Their main focus of work today, the use of medicines (in hospitals, in outpatient clinics, in primary care, in community pharmacies, in patients' homes) requires interprofessional and coordinated care. All current data leads to the utmost necessity of interprofessional care for the safety of patients, as well as the efficient use of medicines and the healthcare resources.

Limitations

This review has some limitations. The articles included in the review were those published in English, Spanish and Portuguese. Only publications from the last 5 years were included and there was not searched in the gray literature. Thus, important

discoveries can be missed.

Acknowledgments

This work was supported by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brazil (CAPES) - Funding Code 001.

Declaration of interest statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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