



RESEARCH ARTICLE

Perceptions of European students' representative associations about clinical pharmacy undergraduate education

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Abstract

Background: Clinical pharmacy education is an enabler of advanced pharmacy practice for the future workforce. **Objective:** To explore perceptions of students' representative associations on the adequacy of undergraduate clinical pharmacy education and students' preparedness to perform clinical activities. **Methods:** Cross-sectional study using an online survey disseminated through the European Pharmaceutical Students' Association to affiliated national pharmacy students' associations. The survey collected information about preparedness to perform clinical pharmacy activities, perceived fitness for practice, perceived adequacy of theoretical and practical education in clinical pharmacy, and learning methods used and desired. **Results:** Students' representative associations from 16 European countries participated and unanimously stated that clinical pharmacy practical training was insufficient. Most respondents (n=12; 75.1%) reported being unfit or unsure about their fitness to perform clinical activities. **Conclusion:** Although clinical pharmacy is embedded in pharmaceutical sciences education, students felt unprepared to perform clinical activities and desired more practical training to increase job readiness.

Introduction

Clinical pharmacy is the branch of pharmacy that focuses on optimising the use of medicines by both patients and professionals to improve patient health outcomes (American College of Clinical Pharmacy, 2008; Dreischulte *et al.*, 2022). Clinical pharmacists can work in a variety of healthcare settings, mainly focusing on medication management and optimisation, in close collaboration with other healthcare professionals (Mansur, 2016).

To achieve the goal of optimising the use of medicines, pharmacists must know how to prevent, identify, and solve drug-related problems (DRPs). A DRP is defined by the Pharmaceutical Care Network Europe (PCNE) as “an

event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes”. It includes, among others, inappropriate drug/dose selection, adverse drug reactions (ADRs), drug or food interactions, and poor communication between healthcare professionals and/or between healthcare professionals and patients (Pharmaceutical Care Network Europe Foundation, 2010). Clinical pharmacy activities that can prevent, identify, and solve DRPs include monitoring ADRs, identifying potential drug-drug and drug-food interactions, medication reconciliation and review, the provision of information about medicines, and medication adherence support. A study found that, when involved in medication reconciliation, pharmacy students and technicians can provide valuable support to other healthcare professionals while being

accurate and time-efficient (Champion, Loosen & Kennelty, 2019).

Although pharmacists are expected to be sufficiently qualified to perform and deliver clinical pharmacy-related activities and services, in some countries such as the United Kingdom (UK), it is mandatory that besides the clinical undergraduate education, pharmacists enrol in specific clinical pharmacy postgraduate education before performing such activities. In some countries, clinical pharmacy is even recognised as a speciality area. Clinical pharmacists are specialised healthcare professionals involved in all stages of care, from primary care to long-term care, and use a patient-centred approach in collaboration with other healthcare providers to optimise patient health and medication outcomes (Jacobi, 2016).

The American College of Clinical Pharmacy (ACCP) identified six domains where clinical pharmacists are expected to be competent: direct patient care, pharmacotherapeutic knowledge, systems-based care and population health, communication skills, professionalism, and continuing professional development. Developing competencies in these areas could result in improved clinical care delivery and awareness of the clinical decision-making process (Saseen *et al.*, 2017).

Various teaching and learning approaches can be used in pharmacy education to prepare students for patient-centred practice, such as lecture-based, problem-based, team-based, game-based, and blended-based learning. Besides teaching and learning strategies, methods for assessing student knowledge and competencies are also worth mentioning. Apart from the traditional approaches (e.g., written examinations), more innovative assessment methods exist, such as simulation-based assessments, including simulation of prescriptions checks, Objective-Structured Clinical Examinations (OSCE), or Objective-Structured Assessment of Technical Skills (OSATS) (Nunes-da-Cunha & Fernandez-Llimos, 2019).

Regardless of the teaching methods used, clinical teaching should ideally include four levels of clinical competence acquisition and assessment tools. Clinical competence can be acquired based on fact-gathering and recalling (assessed by written tests), knowledge interpretation and application (assessed by clinical problem-solving), demonstration of learning (assessed by clinical skills practical demonstration), and performance in practice gained during daily clinical practice (Miller, 1990). Undergraduate education tries to cover all those aspects through lectures, group work, and practical activities whenever possible. However, challenges are still present as differences in curricula are found globally and regionally. In Europe, education is still

very much devoted to basic sciences, while in the United States of America (USA), there is a higher load of patient-centred care teaching and learning hours (Nunes-da-Cunha *et al.*, 2016). Irrespective of the need to increase the number of clinically-oriented teaching and learning hours in Europe, efforts have been made to gear a transformation of pharmacy education towards a more patient-centred education throughout European pharmacy schools (International Pharmaceutical Federation - FIP, 2013; Arakawa, Bruno-Tomé & Bates, 2020).

The Bologna Declaration, signed back in 1999, harmonised undergraduate education in pharmaceutical sciences in Europe, foreseeing a five-year degree comprising at least four years of full-time theoretical and practical training and a six-month traineeship in a community pharmacy open to the public or a hospital (European Commission, 2013). Although the structure of pharmaceutical sciences curricula offered across Europe is harmonised, there are many variations in the content taught, the number of contact hours dedicated to each area of pharmaceutical knowledge, and the amount of practical teaching in the different pharmacy faculties (Arakawa, Bruno-Tomé & Bates, 2020).

Aiming at improving pharmaceutical sciences education, both the World Health Organization (WHO) and the International Pharmaceutical Federation (FIP) issued recommendations for pharmacy educators and academics on the vital need for a continuous reviewing process of the curricula and the application of up-to-date teaching and assessment methods (International Pharmaceutical Federation - FIP, 2014; World Health Organization, 1994). A WHO report on the role of the pharmacist in the healthcare system mentioned that beyond pharmacy academics, "students, pharmacy practitioners and other concerned parties have important contributions to make in the planning and management of curricula" (World Health Organization, 1994).

Students' associations play a prominent role in advocating for students' academic needs. The European Pharmaceutical Students' Association (EPSA) is the umbrella organisation of pharmaceutical student associations in Europe, representing more than 100,000 European pharmacy students in 37 countries. EPSA has been advocating for a more patient-centred education of future pharmacists throughout Europe (EAFP/EPSA, 2010). Members of EPSA include national or regional pharmacy students' associations (i.e., at least one per country), individual students, and an alumni network. As part of EPSA's work, the association continuously strives towards improvements in pharmacy education and changes in the pharmacy curricula that aim to develop a set of skills that allow pharmacists to be professionally competent, regardless of the country they come from

and the area of practice they choose (EPSA & ESN, 2020). EPSA also has advocated the inclusion of more soft skills in the curricula to prepare pharmacists to acquire capacities that enable them to properly conduct a clinical conversation with a patient and lead other healthcare professionals towards evidence-informed health decisions (European Pharmaceutical Students' Association, 2016).

Student perceptions are essential for assessing the outcomes of academic curricula to prepare professionals for their future careers. A significant academic obligation is ensuring that pharmacy graduates have the necessary set of skills and are ready to practice from day one after graduation. Despite all the good intentions and efforts made by pharmacy schools, student perceptions of preparedness for practice do not always match the expectations. The possibility of expressing opinions allows students to be involved from the beginning of the learning process and provide feedback to their supervisors on educational matters (Banneheke *et al.*, 2017). Student motivation and attitudes towards learning in the context of clinical pharmacy can be developed during studies and usually improve from baseline to graduation as a natural development of skills and experiences acquired during pharmacy studies (Margolis *et al.*, 2020).

This study aimed to understand the perception of European pharmaceutical sciences students' representative associations about the adequacy of the curricula and learning methods on their preparedness to perform clinical pharmacy activities.

Methods

Study design

On behalf of the Education Committee of the European Society of Clinical Pharmacy (ESCP), a cross-sectional study was performed using an online survey targeting pharmaceutical sciences students' representative associations. The survey was disseminated by EPSA to all affiliated national pharmacy students' associations through their contact person (CP – designated person in each association to carry out all contacts with EPSA). Data were collected between the 4th and 24th of January 2021. An e-mail reminder was sent to all EPSA members ten days prior to the survey closing.

Population sample

The student associations that are part of EPSA mainly represent undergraduate students. Only one answer per country was allowed, aiming to represent a national perception of clinical pharmacy education in Europe.

Data collection tool

Prior to dissemination, the survey was pilot tested by the Board of EPSA, which is also made up of students. Some necessary amendments were included, resulting in the final version of the survey.

The tool was developed in English with clear and understandable language and included six closed-ended questions related to preparedness to perform clinical pharmacy activities, perceived fitness for practice, perceived adequacy of theoretical and practical education hours (2 questions), learning methods used, and learning methods desired (Table I). A final open question enabled the collection of additional relevant information. The survey has not been fully validated but was derived from a previous one described elsewhere (Moura *et al.*, 2021).

Data analysis

Data analysis was undertaken using IBM SPSS Statistics, version 26. For the analysis of the open question, manual thematic coding was used, and relevant quotes are presented in the results section.

Results

Students' representative associations from 16 countries affiliated with EPSA (43.2%) answered the survey: Austria, Belgium, Croatia, Germany, Greece, Hungary, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Switzerland, The Netherlands, and the UK. Table II displays an overview of all responses.

Perceived preparedness to perform clinical pharmacy activities

Most respondents felt either unprepared (n=5; 31.2%) to perform clinical pharmacy activities or had a neutral opinion about their preparedness (n=7; 43.8%) (Figure 1).

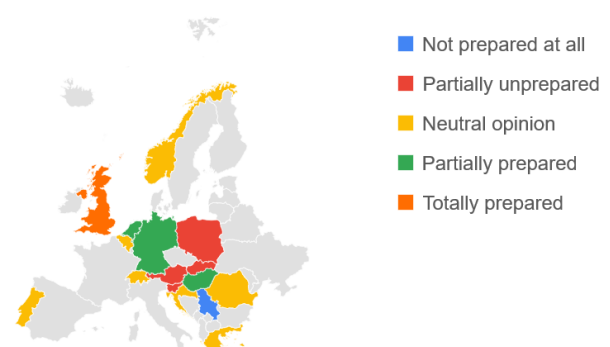


Figure 1: Perceived preparedness to perform clinical pharmacy activities

Table 1: Survey to collect students' perspectives to map undergraduate clinical pharmacy education

Question	Response options
Section 1. Respondent Identification	
We are preferably looking for ONE answer per country. In case your country has more than one national pharmacy student association, please, analyse TOGETHER the information and give us just ONE answer for your country.	
Which country are you responding for?	Any country which has pharmacy students' national association affiliated with EPSA
Which association(s) are you representing?	Any pharmacy students' national association affiliated with EPSA
Please, give direct contact information (e.g. email address) of the association(s) you are representing.	-
Section 2. Clinical Pharmacy at the undergraduate level	
What is considered CLINICAL PHARMACY?	
ESCP defines Clinical Pharmacy as a scientific discipline and a branch of pharmacy practice, which aims to optimise the therapeutic use of medicines by patients and professionals in order to maximise the likelihood that an optimal balance of clinical, humanistic, and economic outcomes is achieved. Here you can find some examples of Clinical Pharmacy course units to consider:	
a) Clinical Pharmacy (CP);	
b) Pharmaceutical care (PC);	
c) Any unit comprising any of these terms CP or PC in their name;	
d) Rational use of medicines;	
e) Pharmacokinetics;	
f) Pharmacoeconomics;	
g) Patient care;	
h) Evidence-based pharmacy;	
i) Clinical practice	
j) Pharmaceutical services	
What is expected from you as a representative of the country's national pharmacy student association?	
Please give the most accurate answer, based not only on your perspective, but the perspective of students from different pharmacy faculties if applicable (e.g., do a quick consultation with your team members).	
How prepared do you feel to perform specific clinical tasks (e.g., medication reconciliation, medication review, pharmacokinetic calculations, solving drug-drug interactions, etc) when you get out of university?	1- Not prepared at all 2- Partially unprepared 3- Neutral opinion 4- Partially prepared 5- Totally prepared
How do you evaluate, in general terms, the education in clinical pharmacy in your country?	1- Totally unfit for practice 2- Partially unfit for practice 3- Neutral opinion 4- Partially fit for practice 5- Totally fit for practice
How do you evaluate the percentage of theory teaching in clinical pharmacy course units?	1- We should have less 2- It is about right 3- We should have more
How do you evaluate the percentage of practical teaching in clinical pharmacy course units?	1- We should have less 2- It is about right 3- We should have more
From the options below, please choose the ones that you have in your country/faculty as ways to provide clinical pharmacy knowledge and skills.	1- Lecture-based learning 2- Practice-based learning (e.g., by internships where there is contact with real patients) 3- Problem-based learning (e.g., clinical cases analysis) 4- Team-based learning (i.e., teams of 5-7 students with diverse backgrounds with the goal of developing team learning simultaneously as students achieving course objectives) 5- Game-based learning (i.e., use of educational games) 6- Blended learning (i.e., learning that combines online and in-person learning) 7- None of the above 8- I do not know
Please choose (at maximum 3) from the options below the preferred ways to acquire clinical pharmacy knowledge and skills (either you have it or not implemented in your country/faculty)	1- Lecture-based learning 2- Practice-based learning 3- Problem-based learning 4- Team-based learning 5- Game-based learning 6- Blended learning 7- None of the above
Do you want to provide any further comments/suggestions?	Open-ended question

Table II: Students' perceptions of adequacy of clinical pharmacy undergraduate education

Country	Perceived preparedness to perform clinical pharmacy activities	Perceived fitness for practice of clinical pharmacy education	Perceived adequacy of theory-based learning (quantity)	Perceived adequacy of practice-based learning (quantity)	Existing learning methods	Desired learning methods
Austria	Partially unprepared	Partially unfit for practice	We should have more	We should have more	<ul style="list-style-type: none"> Lecture-based learning Problem-based learning 	<ul style="list-style-type: none"> Lecture-based learning Problem-based learning
Belgium	Neutral opinion	Neutral opinion	It is about right	We should have more	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning 	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning
Croatia	Neutral opinion	Partially unfit for practice	We should have more	We should have more	<ul style="list-style-type: none"> Lecture-based learning Problem-based learning Team-based learning Blended learning 	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning
Germany	Partially prepared	Partially unfit for practice	We should have less	We should have more	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning Team-based learning Game-based learning Blended learning 	<ul style="list-style-type: none"> Practice-based learning Problem-based learning Team-based learning
Greece	Neutral opinion	Partially unfit for practice	We should have more	We should have more	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning Blended learning 	<ul style="list-style-type: none"> Practice-based learning Problem-based learning Team-based learning
Hungary	Partially prepared	Neutral opinion	We should have more	We should have more	<ul style="list-style-type: none"> Lecture-based learning Problem-based learning 	<ul style="list-style-type: none"> Practice-based learning Problem-based learning Team-based learning
Norway	Neutral opinion	Partially unfit for practice	We should have more	Missing answer	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Team-based learning 	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Team-based learning
Poland	Partially unprepared	Partially unfit for practice	We should have less	We should have more	<ul style="list-style-type: none"> Practice-based learning Problem-based learning Team-based learning 	<ul style="list-style-type: none"> Practice-based learning Problem-based learning Blended learning
Portugal	Neutral opinion	Partially fit for practice	It is about right	We should have more	<ul style="list-style-type: none"> Lecture-based learning Problem-based learning Team-based learning Blended learning 	<ul style="list-style-type: none"> Lecture-based learning Problem-based learning Team-based learning
Romania	Neutral opinion	Partially unfit for practice	We should have more	We should have more	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning Game-based learning 	<ul style="list-style-type: none"> Practice-based learning Problem-based learning Team-based learning
Serbia	Not prepared at all	Totally unfit for practice	We should have less	We should have more	<ul style="list-style-type: none"> Lecture-based learning Problem-based learning 	<ul style="list-style-type: none"> Practice-based learning Team-based learning Game-based learning
Slovakia	Partially unprepared	Partially unfit for practice	We should have more	We should have more	<ul style="list-style-type: none"> Lecture-based learning Problem-based learning 	<ul style="list-style-type: none"> Practice-based learning Problem-based learning Team-based learning
Slovenia	Partially unprepared	Neutral opinion	We should have more	We should have more	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning Game-based learning 	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning
Switzerland	Neutral opinion	Partially fit for practice	It is about right	We should have more	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning Team-based learning Blended learning 	<ul style="list-style-type: none"> Practice-based learning Problem-based learning Blended learning

Country	Perceived preparedness to perform clinical pharmacy activities	Perceived fitness for practice of clinical pharmacy education	Perceived adequacy of theory-based learning (quantity)	Perceived adequacy of practice-based learning (quantity)	Existing learning methods	Desired learning methods
The Netherlands	Partially prepared	Partially fit for practice	It is about right	We should have more	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning Team-based learning Game-based learning 	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Team-based learning
United Kingdom	Totally prepared	Totally fit for practice	It is about right	We should have more	<ul style="list-style-type: none"> Lecture-based learning Practice-based learning Problem-based learning Team-based learning Game-based learning Blended learning 	<ul style="list-style-type: none"> Practice-based learning Game-based learning Blended learning

Perceived fitness for the practice of clinical pharmacy education

Aligned with the perceived unpreparedness to perform clinical pharmacy activities, the data also pointed out that there is a perception that the provided education is not or only partially adapted to the demands of clinical practice (n=9; 56.3%) (Figure 2).

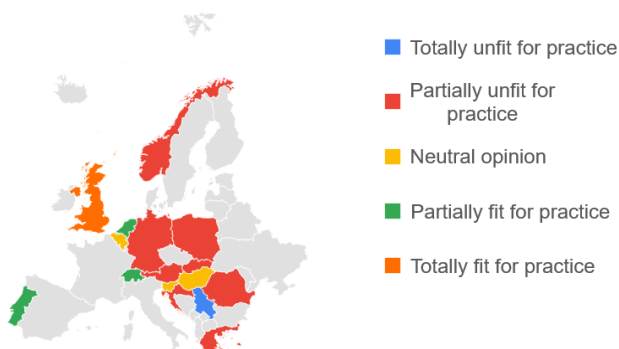


Figure 2: Perceived fitness for practice of clinical pharmacy education

Perceived adequacy of theory-based and practice-based learning

An insufficient amount of theory-based learning was perceived by 50.0% of country respondents (Figure 3), whereas this accounted for 100.0% of practice-based learning (Figure 4).

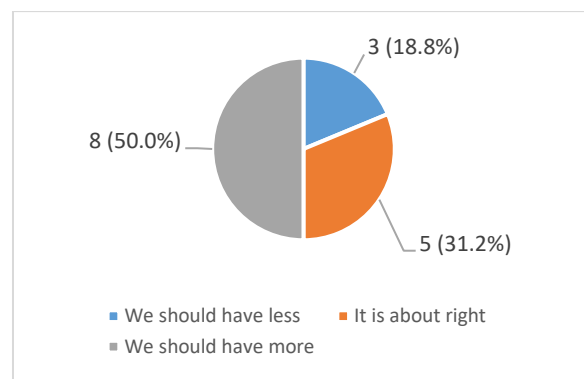


Figure 3: Perceived adequacy of theory-based learning (quantity)

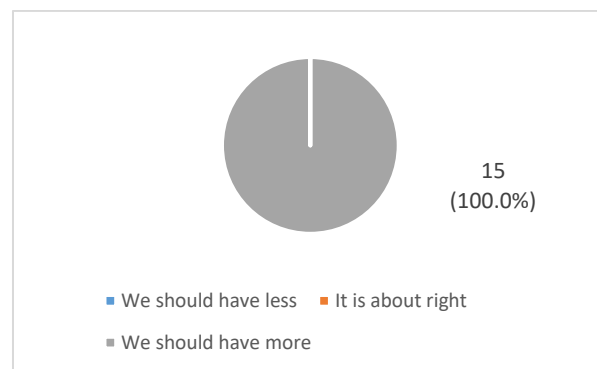


Figure 4: Perceived adequacy of practice-based learning (quantity)

Existing and desired learning methods

Almost every country respondent reported having lecture-based (n=15) and problem-based learning (n=14). Most country respondents also reported to have practice-based learning (n=10), whereas team-based (n=8), game-based (n=5), and blended learning (n=6) were only reported in a few European countries (Figure 5).

When asked to choose three teaching methods they would like to have when learning clinical pharmacy, regardless of their current reality, country respondents expressed a notable preference for practice-based (n=15), problem-based (n=13), and team-based learning (n=8) (Figure 5).

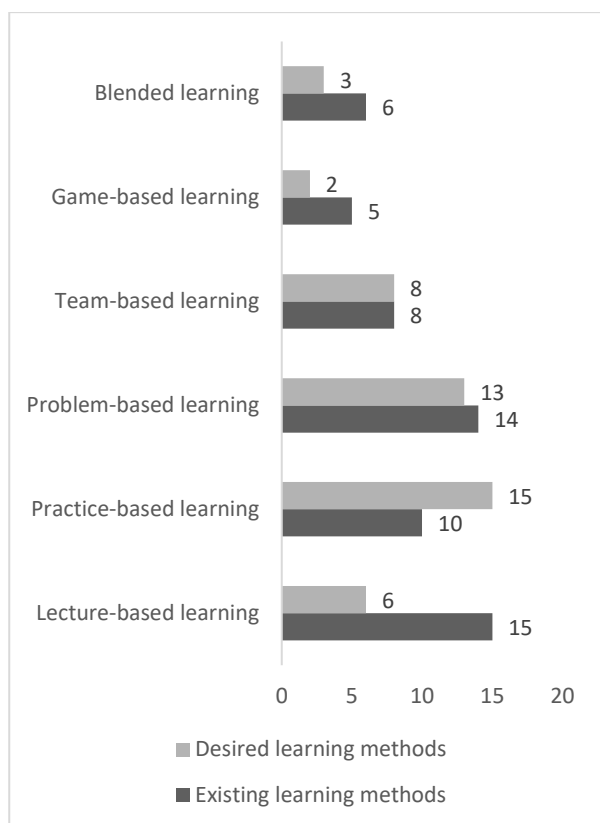


Figure 5: Desired versus existing learning methods

Most comments expressed by participants were primarily used to check for internal consistency and conformity with previous answers. However, comments made about access to optional course units suggested a need for change:

“In some faculties, most course units related to clinical pharmacy are optional, so not all students have the opportunity to acquire knowledge at this level. This represents a gap in students' curricula, since the understanding of clinical pharmacy is essential for a good and future health professional” [Respondent from Portugal].

The Portuguese respondent made this comment because most pharmacy schools in the country allow students only to choose one optional course unit among those available in a given term. This fact leads to unequal access of students to clinical pharmacy course units, which in some cases are only available as optional course units.

Discussion

More than half of participating students' representative associations stated that their clinical

pharmacy education did not prepare them for practice. Only the pharmacy students association from the UK perceived their undergraduate education to be completely fit for practice, which seems aligned with the frequent mention in the literature of the UK being one of the leading-edge countries in clinical pharmacy education and practice (Rushworth *et al.*, 2021). The search for factors influencing the implementation of clinical pharmacy services (Sin *et al.*, 2022), the conscious need to determine the appropriate workforce necessary to strengthen clinical pharmacy (Bednall *et al.*, 2021), and all the work developed to establish competency frameworks for the widening scope of clinical pharmacy in the UK are all probable contributors to this finding (Forsyth *et al.*, 2019). Conversely, only the Serbian pharmacy students' association perceived their clinical pharmacy education as totally unfit for practice. Fitness for practice does not solely result from the amount of time devoted to specific topics but also from the adequacy of learning and assessment methods used (Nunes-da-Cunha & Fernandez-Llimos, 2019).

Every country has different needs for the pharmacy workforce that should be considered by pharmaceutical sciences educators when designing the curricula and related learning and assessment methods to align with local pharmacy practice needs (International Pharmaceutical Federation – FIP, 2014). Despite these country-specific needs, FIP has developed various guidelines and recommendations related to pharmacy education. Among these, the FIP Nanjing Statements describe the envisioned future for pharmaceutical education necessary to enhance professional standards worldwide. The FIP Nanjing Statements highlight the need for providing structured experiential learning for pharmacy students through on-site clinical experiences. (International Pharmaceutical Federation – FIP, 2017). On-site experiences, such as internships, clinical pharmacist shadowing, and discussion of real-life patient cases, should take place ideally throughout the entire pharmacy undergraduate education path and not only at the end of the journey, as those experiences highly contribute to better preparedness for undergraduate students. More recently, FIP defined 21 development goals for the pharmacy profession. The first one, designated as “Academic capacity”, reflects the ambition to have a competent clinical academic educator workforce capable of developing both initial and continuous professional development training. This goal includes creating capacity-building initiatives, developing new and innovative ways to attract young pharmacists into all areas of pharmaceutical practice and science, working to enhance interdisciplinary and interprofessional education, and using data and

evidence to inform the need for any structural changes in education, including the assessment of its impact (International Pharmaceutical Federation – FIP, 2020).

Although lecture-based learning historically has been the most common teaching method, over the past years, pharmacy educators have been encouraged to apply more experiential teaching models (e.g., team-based and problem-based learning) as they are more effective in enhancing students' knowledge (Almeman & Alrebish, 2018). Yet, students' representative associations participating in our study still reported a preponderance of lecture-based over practice-based learning while referring to problem-based and practice-based learning as their preferred education method in clinical pharmacy. The referred to preferred teaching methods are often linked to the use of digital technologies as enablers of more interactive approaches for learning that oppose the traditional passive lecture and involve students more in the clinical process (Richard, Hastings & Bryant, 2015).

Almost every country respondent reported having problem-based learning in their curricula. This method can be interesting for teaching clinical pharmacy since it allows the inclusion of case studies and other real-life situations that can enable critical thinking and shared decision-making (Montepara, Woods & Wolfgang, 2021). Expectedly, respondents expressed a preference for more practice-based and problem-based learning methods due to their interactive and didactic nature.

Students' perceptions across Europe about clinical pharmacy teaching and learning methods in curricula are relevant for analysis to identify potential barriers and facilitators affecting the quality and efficiency of clinical pharmacy education and practice. The perception of limited access to clinical pharmacy topics in the curricula is partly attributable to the sometimes-optional way these courses are offered to students while they should be part of the compulsory programme.

Students should be sufficiently prepared to engage in clinical pharmacy activities and services to complete their clinical internships and/or first clinical jobs with enough confidence, particularly in pharmacy teams working in a multidisciplinary setting. There is room for improvement in preparing students for practice by making them feel more prepared and confident, as most respondents either felt unprepared to carry out clinical pharmacy activities or had a neutral opinion about their level of preparedness.

Limitations

This study has some limitations. The sample used to illustrate the perceptions of students' representative

associations was small and did not span all European countries. Although limited, the response rate is in line with what can be expected based on what is described in the literature for online surveys (Meyer *et al.*, 2022). Involving students' associations may be seen as a strength as they are expected to provide a more holistic view of student perceptions and educational offerings within their respective countries. However, while the research team highlighted that the responses should be in line with the views of all students, the data may have included responses from individual students that did not embrace the opinions of all students. In some cases, responses may have only described the reality from a specific university where the participant was studying rather than reflecting the national situation. Nonetheless, the present study provides an exploratory assessment of students' opinions and preferences regarding undergraduate clinical pharmacy education and might enable future studies in this area. The involvement of students' associations is expected to bring a collaborative vision on this topic and complement previous studies reflecting the views of academics (Moura *et al.*, 2021). It might also inspire policy work and inform the development of strategies to shape pharmacy curricula to the best interests of students with regard to clinical pharmacy education in Europe.

Conflict of interest

Rúben Viegas works for the International Pharmaceutical Federation.

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