

Mapping Clinical Pharmacy Education and Practice in Europe

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Abstract

Background Clinical activities provided by pharmacists are increasing worldwide, including Europe. However, an overview of clinical pharmacy education and practice is needed.

Objective To map clinical pharmacy (CP) education and practice among European countries.

Setting: Web-based survey led by the Education Committee of the European Society of Clinical Pharmacy (ESCP).

Method Cross-sectional study resorted to a survey sent to ESCP members. The survey comprised three domains focusing on: undergraduate education, postgraduate education, and practice. A multi-phased validation process was undertaken, attributing levels of evidence according to the number of information sources for each country. Triangulation was used to seek within country consensus. Student perceptions on their preparedness to engage in CP and adequacy of learning methods were also explored via the European Pharmaceutical Students' Association (EPSA), representing students from 37 countries.

Main outcome measures Number of hours of education in clinical pharmacy; existence of a specialization in clinical pharmacy and activities delivered in practice.

Results Data from 40 European countries were included (response rate 95.2%). Most respondents (86.8%) agreed with the definition of CP proposed by the ESCP. Almost every country (94.9%) reported to have CP topics integrated at the undergraduate level [median number=65 hours/semester (IQR: 2.0-5.6)], including practical teaching [median=30.0% (IQR: 17.0-42.0)]. Students from 16 countries were unanimous stating CP practical training to be insufficient and only in one country CP education was perceived as totally fit for practice. At the postgraduate level, 92.5% of countries have PhD programmes including CP and 65.0% specific CP master/diploma degrees. Continuous professional development (CPD) courses were also reported by 63.9% of respondents. More than half of countries (52.5%; n=21) recognize CP as an area of specialization, which for 60.0% of countries is applied solely in the hospital setting.

Conclusion Although CP is embedded in education and practice in European countries, students experience a lack of practical training hampering job readiness. Education in CP should be adapted and tailored towards the skills and competences required in practice.

Impact Of Finding On Practice Statements

- The definition of Clinical Pharmacy (CP) as proposed by the ESCP is currently adopted by most CP academics in Europe;
- Clinical pharmacy is widely implemented in almost every European country, although with varying levels of intensity, thus potentially leading to varied levels of expertise in clinical pharmacy practice;
- This mapping of clinical pharmacy education and practice in Europe can be a trigger for academics and practitioners to perform a more detailed benchmark of CP programmes and practices aiming at standardization and quality assurance;
- Students representing 16 European countries perceived CP practical training to be insufficient for job readiness.

Introduction

Clinical pharmacy (CP) is defined by the European Society of Clinical Pharmacy (ESCP) as a scientific discipline and a branch of pharmacy practice that aims to optimise the therapeutic use of medicines by patients and professionals to maximise the likelihood that an optimal balance of clinical, humanistic, and economic outcomes is achieved. [1] The American College of Clinical Pharmacy (ACCP) defines it as a health science discipline in which pharmacists provide patient care that optimizes medication therapy and promotes health, wellness, and disease prevention. [2] The value of clinical pharmacists' interventions has been studied in various healthcare settings [3-4], with growing recognition of the value of skill-mix in healthcare teams. [5-6] Clinical pharmacists' activities include medication review, therapeutic drug monitoring, supporting medication adherence and optimising medication safety and cost-effectiveness. [6-7] Increased clinical responsibilities demand advanced competencies in CP, thus undergraduate education must be consolidated through lifelong learning. [8-9] Clinical pharmacists must possess scientific, professional, and personal skills. Scientific skills include a comprehensive understanding of diseases, medicines' mechanism of action, interactions, and adverse drug reactions. Professional skills comprise the ability to manage and review patients' medicines, assess, and interpret laboratory findings. Personal skills include communication, decision making, critical thinking and team working skills. [5;10-11] A study comparing pharmacy curricula shows that in Europe, education is still very much devoted to basic sciences, whereas the US have a higher load of patient-centred care course units. [12] A global comparison of undergraduate pharmacy education curricula shows that the pharmacy practice cluster (which includes CP) have the biggest variance. [13] Full acquisition of clinical competence is extremely important and explained by Miller that proposes a four-level acquisition and assessment model. Starting from "knowledge-based learning" (assessed by written tests), moving to "competence-based learning" (by clinical problem solving) as well as "performance-based learning" (by clinical skills practical demonstration), and finally by applying clinical knowledge in practice during daily patient care. [14] Lifelong learning through continuous professional development (CPD) is part of pharmacists' responsibilities along their career path and in CP, is the only way to be fully accountable for achieving optimal patient outcomes. [8;15] Specialization can be part of the undergraduate education and part of CPD and although different areas of specialization exist across the world, most tend to be based on experiential learning, strongly anchored on the last level of Miller's pyramid. The American Board of Pharmacy Specialities recognize 14 speciality practice areas in the domain of CP. [16] In the United Kingdom, clinical pharmacists can specialize in specific areas within CP, including mental health, oncology, and paediatrics. [17]

Much of the literature is fragmented, either by focusing on a specific country, or by capturing education whilst failing to capture practice. [13;18] An approach, describing both education and practice in CP is lacking. Therefore, as a European-centred organisation with a strong focus on education and practice, ESCP engaged in this mapping exercise to fill in this void. [7;19]

Aim of the study

This study aims to map the education and practice of CP in European countries by collecting information on the proportion of units or courses devoted specifically to the topic during and after graduation, and by auditing the existence of specialization in CP practice. As a secondary aim, we intended to explore students' perceptions about undergraduate education and its fitness for practice.

Ethics approval

The study was approved by the Ethics Committee of the Faculty of Pharmacy, University of Lisbon, n° 02/2019.

Method

Study design

A cross-sectional study was used collecting information from October 2018 until January 2019, and subject to sequential rounds of data validation throughout 2019 and 2020. The study targeting students, also cross-sectional, was performed in January 2021.

Population and sample

We initially considered 47 European countries. [20] Countries where no faculty of pharmacy existed (Andorra, Liechtenstein, Monaco, Montenegro, and San Marino), according to the European Association of Faculties of Pharmacy (EAFP) and the International Pharmaceutical Federation (FIP) World List of Faculties of pharmacy, were excluded, totalling 42 countries. The European Pharmaceutical Students' Association (EPSA) represents pharmaceutical undergraduate student associations from 37 countries.

Data collection tool

Data were collected through a web-survey (Jotform) developed using a sequential approach, where two investigators (FAC and SS) developed an initial version to capture three domains: undergraduate education, postgraduate education, and practice. Subsequently, investigators from the ESCP Education Committee (SR, and BA) and the General Committee (HSB) revised it. The final version of the survey included an initial section introducing the ESCP definition of CP, a glossary (supplementary file 1) and contained three domains (supplementary file 2):

- Undergraduate education: identification of topics covering CP (as defined by ESCP) and if existing, number of semesters, number of contact hours/semester, number of European Credit Transfer System (ECTS)/semester and proportion of time devoted to practical teaching;
- Postgraduate education in CP: identification of specific postgraduate master/diploma degrees; identification of PhDs; CPD courses; and other types of courses or certificates. For all types of postgraduate courses, except for PhDs, their name, number of hours and proportion of time attributed to practical teaching was collected. For postgraduate master/diploma degrees, the number of semesters and the number of ECTS/semester, was also requested;
- Professional practice: identification of national recognition of CP as an area of specialization, and if existing, professional rights or job specifications granted; whether or not legally anchored, field of application of CP; listing of specialization areas under the domain of CP; existence of pharmacy competence frameworks, and whether these include CP.

The dissemination of the survey was multi-staged, first addressing all ESCP members working in academia, secondly adopting a snowballing approach through the ESCP Education Committee, and finally also by reaching out to the EAFP for further dissemination among their members.

The survey targeted at EPSA was succinct as it aimed at capturing perceptions and not to quantify course units. It included six questions related to: preparedness to deliver CP; perceived fitness for practice of education;

perceived adequacy of theoretical and practical workload (2 questions); learning methods used and learning methods desired (supplementary file 3).

Data validation and consolidation

Because there is no central registry indicating the contact person for academic matters per country, all survey participants were considered potentially valid responders. This entailed that multiple answers for one country were received and responses contrasted. To ensure valid data were retained, a 4-staged validation process was developed: (1) contrasting responses, analysis and interpretation by the first author (LM); (2) development of a preliminary report with unified answers per country, sent to all participants, asking for clarification of inconsistencies within countries and requesting missing data; (3) development of a second report including the validated data and made available for public consultation on the ESCP website from July 1st, 2020 until August 31st, 2020 and via EAAP. The fourth and final stage resorted to FIP's World List of Pharmacy Schools, and random selection of three pharmacy faculty websites/country consulted by LM for complete undergraduate curriculum (preferably of 2018–2019) analysis. Details about elective and optional CP course units were searched. Average numbers of contact hours and ECTS were calculated and compared against ESCP's data, enabling exclusion of impossible values.

Levels of evidence were attributed according to the information sources used for each country, ranging from one to three: (1) only initial respondents; (2) independent respondents validating initial responses; and (3) web-data validation.

Data collected through EPSA was used as factual data without further validation needed as it reflects opinions.

Data analysis

Data were analysed resorting to univariate descriptive statistics and bivariate analysis to explore associations between variables. Hypotheses investigated explored the association between the number of contact hours in CP at undergraduate as well as at postgraduate level with the recognition of CP as a specialization. Analyses were undertaken using IBM SPSS Statistics 26.

Results

Data from 40 countries were obtained for the ESCP survey, representing 95.2% of European countries delivering education in pharmaceutical sciences.

ESCP definition of clinical pharmacy

Most respondents (n = 33; 86.8%), agreed with the current ESCP definition of clinical pharmacy and stated it was adopted in their country (Fig. 1).

Undergraduate education in CP

The number of faculties providing a degree in pharmaceutical sciences within a country ranged between 1 and 56 (mode = 3). In 37 of 39 responding countries (94.9%), CP was part of the undergraduate curricula. The median number of semesters devoted to CP was 2.3 semesters, with a median of 65 contact hours/semester (IQR: 41.5-

128.5). Median proportion devoted to practical teaching was 30.0% (IQR: 17.0–42.0) (Table 1). Most European countries (n = 30; 83.3%) stated to have undergraduate education in CP accredited by a regulatory body.

Table 1
Characteristics of undergraduate education in clinical pharmacy in Europe

Table 1: Pattern of undergraduate education in clinical pharmacy in Europe	Median (IQR)
Number of semesters focusing on clinical pharmacy	2.3 (2.0-5.6)
Number of contact hours/semester	65.0 (41.5-128.5)
Number of ECTS/semester	6.0 (5.0–10.0)
Proportion (%) of contact hours devoted to practical teaching	30.0 (17.0–42.0)

Students' perceptions about undergraduate education

Representative students' associations from 16 countries affiliated with EPSA answered the survey (43.0%). Most respondents felt unprepared or unsure about preparedness to perform CP activities (75.0%) and felt that the provided education is partially or totally unfit for practice (56.3%). Insufficient theory-based learning was perceived by 50.0% of respondents whereas this amounted to 100.0% for practice-based learning. Comparing existing and desired learning methods, there was an expressed preference for more practice and problem-based learning (Table 2).

Table 2
Students' perceptions about adequacy of CP undergraduate education

Item evaluated	Response options	n (%)
Perceived preparedness to perform CP activities	Not prepared at all	1 (6.3)
	Partially unprepared	4 (25.0)
	Unsure	7 (43.8)
	Partially prepared	3 (18.8)
	Totally prepared	1 (6.3)
Perceived fitness for practice of CP education	Totally unfit for practice	1 (6.3)
	Partially unfit for practice	8 (50.0)
	Unsure	3 (18.8)
	Partially fit for practice	3 (18.8)
	Totally fit for practice	1 (6.3)
Perceived adequacy of theory-based learning (quantity)	We should have less	3 (18.8)
	It is about right	5 (31.3)
	We should have more	8 (50.0)
Perceived adequacy of practice-based learning (quantity)	We should have less	0 (0.0)
	It is about right	0 (0.0)
	We should have more	15 (100.0)
	<i>Missing (n = 1)</i>	
Existing learning methods	Lecture-based learning	15
	Practice-based learning	10
	Problem-based learning	14
	Team-based learning	8
	Game-based learning	5
	Blended learning	6
Desired learning methods	Lecture-based learning	6
	Practice-based learning	15
	Problem-based learning	13
	Team-based learning	8
	Game-based learning	2
	Blended learning	3

Postgraduate education in CP

A total of 38 countries reported postgraduate education in CP leading to a degree. Among those, 26 countries (65.0%) reported master's or diploma degrees in CP and 37 countries (92.5%) PhD programmes in the field of pharmacy including CP topics. Twelve European countries with master/diploma degrees in CP are open for foreign students. CPD courses not leading to a degree in CP were reported by 23 countries (63.9%), with varying length, 65.2% (n = 15) of which included practical teaching (Table 3). The most common approach to CPD was an overarching theme, such as CP or pharmaceutical care. Specific topics aligned with activities (*e.g.* medication review, pharmacokinetics, pharmaceutical information, rational use of medicines and safety of medicines) or applicable to clinical areas (*e.g.* hypertension, cardiology, respiratory diseases, or diabetes) were also reported.

In 25 countries, the postgraduate education is accredited by a regulatory body.

Table 3
Characteristics of postgraduate education in clinical pharmacy in Europe

Type of Post-graduate course in CP		Median (IQR)	
Courses leading to a degree	Master/diploma degrees n = 26 (65.0%)	Number of semesters	3.5 (2.0-4.8)
		Number of contact hours/semester	120.0 (78.0-237.5)
		Number of ECTS/semester	15.5 (7.5-30.0)
		Proportion (%) practical teaching	40.0 (30.0-56.0)
Courses not leading to a degree	CPD courses/programmes n = 23 (63.9%)	Number of hours focusing on clinical pharmacy	60 (18.0-120.0)

Professional practice in CP

More than half (52.5%, n = 21) of the participating countries recognize CP as an area of specialization, and among these, 11 (55.0%) have this specialization embedded in national legislation. This recognition was most frequently ensured only by the Ministry of Health (n = 12; 60.0%), but other arrangements were possible, including only by the Ministry of Education (n = 3; 15.0%), only by the National Pharmaceutical Society (n = 3; 15.0%), or by both the Ministry of Health and the Pharmaceutical Society (n = 2; 10.0%). Sixteen of the countries mentioning to have a specialization in CP name it as such. CP specialization was reported as mostly applied in the hospital setting (n = 9; 60.0%), both in community and hospital (n = 5; 33.3%) and in only one country was exclusively applicable to community pharmacy. There were six other countries reporting to have areas of specialization in the domain of CP, although not named as such, including: infectiology, clinical trials, community pharmacy, ward-based work, and medication management. In nine of the countries, this specialization entailed job specifications or specific professional rights, including medication review, prescription review, medicines optimization including economic analysis, risk assessment including pharmacovigilance, read and write access to medical records, involvement in clinical research, and pharmacokinetics, among others.

In the remaining countries where CP is not recognized officially as an area of specialization, CP was still mentioned as part of the activities of community and hospital pharmacists (n = 12; 75.0%), only hospital pharmacists (n = 3; 18.8%) or other areas of practice (n = 1; 6.3%).

Both pre-established hypotheses investigating a potential link between the amount of CP contact hours and its recognition as a specialization could not be confirmed.

Thirteen countries (37.1%) reported national pharmacy competence frameworks, eight of which (61.5%) include CP.

Discussion

The main results of this study demonstrate nearly all European countries (95.2%) include CP as part of the undergraduate curriculum, which goes along with increasing clinical activities provided by pharmacists. [6] Previous literature shows an increased uptake of clinical courses related to medical sciences in pharmacy curricula of European countries. [21]

Three countries did not include practical teaching of CP in their undergraduate curriculum, possibly entailing that students in those countries are not acquiring full clinical competence as the combination with practical training is deemed necessary according to Miller's educational model. [14] In fact, this finding was reiterated by EPSA students' perceptions where all respondents considered they should have more practice-based learning in CP. The variety of reported contact hours and ECTS may have implications on mobility programmes (e.g., Erasmus +) and on early career capacities of recent graduates to engage in CP activities. [22] The analysis of the impact of different levels of CP education and practice within countries justifies further studies. The European legislation provides general guidance into the areas to be included in pharmaceutical sciences education [23] but is then transposed nationally with room for the development of varied curricula, demonstrated through various studies. [12–13;21] Previous research has shown that the proportion of patient-centred courses in pharmacy curricula across Europe varied from 20 to 54%, leaving clear that recent graduates from e.g., Malta or the Netherlands, with a higher load of patient-centred care courses, are probably better prepared to engage in CP compared to those graduating in e.g., Greece or Macedonia, with a lower load of such courses. [12] Student representatives expressed a general lack of confidence in their preparedness to engage and deliver CP activities, possibly explained by their maturity at this stage but also by the perceived unfitness of education for CP practice. Only students from the UK perceived their undergraduate education to be totally fit for practice. Conversely, only Serbian students perceived it 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 methods used and, in this aspect, there was a mismatch between the existing methods and the desired ones. There was a perception of excessive lecture-based learning and insufficient practice-based learning. However, the use of problem-based learning or team-based learning was aligned with students' desires and needs.

Postgraduate education in CP was widely disseminated, although with varying models of delivery in terms of the extent and structure of the courses available in each country. Various courses were reported in the domain of CP, many of which named in alignment with daily clinical activities.

More than half of the countries have CP as a recognized specialty. Specialization may not be a prerequisite for advanced CP practice, as in fact, some countries deliver high quality CP services in the absence of a

specialization in CP, including the UK and Malta. [7;19] Notwithstanding, 60% of respondents stated that this specialization was solely applicable to the hospital setting, which suggests a need for greater investment in the development of CP in the ambulatory setting for better alignment with the Astana declaration. [24]

Although some European countries referred to specific areas of specialization within CP, these were less varied in scope and less structured according to areas of practice, compared to the 14 areas adopted in the US. [16]

Clinical pharmacists' career paths vary widely between European countries, with some needing a specific postgraduate specialization and others providing clinical activities in various settings based on undergraduate education and CPD courses. This finding suggests a unified and structured career path for clinical pharmacists across Europe is needed. A minority of countries reported to have competency frameworks, and those that have such frameworks tend to include CP. Such frameworks are essential to identify a career path and levels of advanced practice and expertise in a certain area. [25]

Most European countries have pharmacy education and training quality assurance systems but seldom focused on CP. [26–27] The implementation of common training quality standards for CP education and practice can further support and standardize education and practice across Europe. There was no association between the extent of CP education and the recognition of CP as a specialization, suggesting that such recognition does not necessarily reflect a higher quality of CP education and training. This fact may also compromise mutual recognition of CP specialization between member states. Therefore, recognition of CP as a speciality domain calls for a standardised pan-European approach.

This study also highlighted that the currently approved ESCP definition is supported and accepted widely in European countries. Even though this finding is reassuring, most respondents were ESCP members, thus external validation by other clinical pharmacists not affiliated with ESCP will be worth exploring in the future.

This study has strengths, including the high representation of European countries and the robust approach to data validation. For most countries (n = 28, 70%), level 2 evidence was obtained, and for seven countries, level 3 evidence was ensured. Only in five countries (Albania, Finland, Kosovo, North Macedonia, and Slovenia), evidence was limited to level 1.

Limitations

Although this mapping exercise was open to contribution by all CP academics and practitioners, the dissemination process led to a self-selected sample, where most participants were likely ESCP members or associates of the EAFP. The inability to identify the best respondent per country led to multiple responses and the need to resort to participatory methods and extra data validation steps. Time between the dissemination of the survey, data analysis and publication may have led to outdated information due to the dynamic nature of education and professional practices. The sample used to illustrate students' perceptions did not span all European countries for which responses have been obtained in the primary survey. The views may not necessarily reflect final year students or all students, and perceptions are not necessarily evidence based. Nonetheless, the information collected was useful to supplement the main study findings and not used for validation purposes.

Conclusion

Clinical pharmacy is taught in almost every targeted European country, both at the undergraduate and postgraduate level, even though with a wide variation in organisation and teaching modalities across countries. Although CP is only recognised in 52.5% of the countries as a distinct specialization, CP activities are part of broadly implemented patient-centred care and have a wide scope of application across Europe.

Declarations

Funding

This project did not receive any funding.

Conflict of interests

SS and HSB are part of the General Committee of ESCP. FAC, BA and SR are part of the Educational committee of ESCP. LM is part of the Young ESCP. The remaining authors have no conflicts of interests.

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Figures

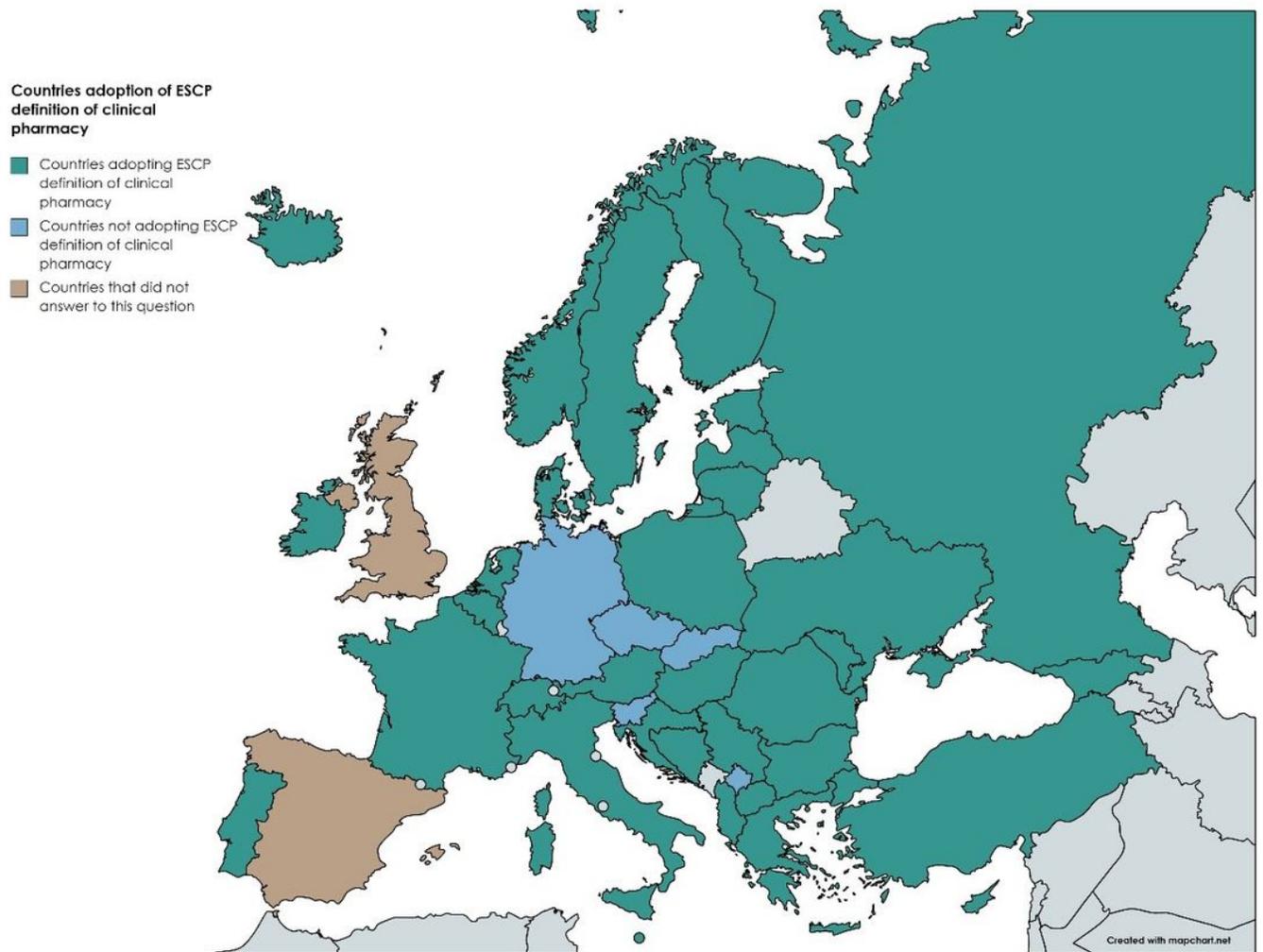


Figure 1

Countries adoption of ESCP definition of clinical pharmacy. Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

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