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SPECIAL ARTICLE

Clinical Pharmacology in European health care—outcome of a questionnaire study in 31 countries

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Abstract
Introduction In order to discover how well the discipline of clinical pharmacology (CP) has developed in Europe, a questionnaire survey was undertaken in 31 countries.
Methods The senior delegate of each of the 31 countries on the Council of the European Association for Clinical Pharmacology and Therapeutics (EACPT) was approached personally. This study was not an official EACPT survey.
Results Based on the results of the completed survey forms, CP is recognized as an academic discipline in teaching and research fields in 28 of the 31 participating countries, but as a medical specialty in only 22 of these 31 countries. Surprisingly, France and Italy were two of the nine countries where CP was not recognized as a medical specialty. In 50 % of the countries where CP was recognized as a medical specialty, this recognition had occurred more than 30 years ago. The training of clinical pharmacologists in terms of years after internship varied between the countries. In eight countries the training was predominantly in internal medicine with shorter periods in pharmacology. In 11 countries the training was predominantly in CP, and in six countries there was dual training in pharmacology and clinical medicine. The training played a decisive role in terms of the clinical functions undertaken in health care. There was considerable variation in the numbers of clinical pharmacologists in each country, with the total figure varying between ≤10 to 600. In terms of the number of clinical pharmacologists per million inhabitants, nine countries have ≤1 (Belgium, Bulgaria, France, Greece, Italy, Lithuania, Poland, Turkey and UK) while four have ≥10 (Hungary, Norway, Slovakia and Sweden). Stumbling blocks which inhibit the development of CP as a discipline in health care are the lack of defined functions and consultant posts for clinical pharmacologists in health care in many countries and the underrepresentation of CP in pre- and postgraduate curricula.
Conclusion The majority of the responding countries suggested that EACPT should prioritize that CP becomes recognized and accredited as a European medical specialty.

Keywords Clinical Pharmacology · Questionnaire survey · European health care · Medical specialty · Bedside pharmacology

Introduction

During the last 3 years the International Union of Basic and Clinical Pharmacology (IUPHAR) has increased its efforts to promote the development of clinical pharmacology worldwide. As part of this work we were asked to edit a multiauthor position paper "Clinical Pharmacology in Research, Teaching and Health Care", which was published in 2010 [1]. Two years later the World Health Organization (WHO) and the Council for International Organizations of Medical Sciences (CIOMS) joined IUPHAR in an extended publication which placed even greater emphasis on the importance and roles of clinical pharmacology in health care, particularly in developing countries [2]. During the editorial processes of both these publications it became apparent that in many countries clinical pharmacology has encountered obstacles that have prevented its development to an integrated academic and clinical specialty.

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As former chairmen of the European Association for Clinical Pharmacology and Therapeutics (EACPT) we sought and received the support of our successors to develop a questionnaire on the development of clinical pharmacology in Europe with particular regard to health care. It was distributed by us to national representatives in the Council of EACPT during the spring of 2011. It must be noted that this questionnaire survey was not a formal EACPT investigation.

Methods

In March–April 2011 we approached the senior national delegate to the EACPT Council of each of 31 European countries to respond to a questionnaire which aimed to map out the present development of clinical pharmacology in their countries. The aim of the questionnaire was to try to describe the role of clinical pharmacology in these various European countries and to find out whether the specialty was formally recognized or not. We also hoped to discover how many clinical pharmacologists there were in each country, what their roles were, particularly in the delivery of health care, and how EACPT could help to increase the impact of the discipline in each country. An interim report on the investigation was sent to all delegates to the European Congress of Clinical Pharmacology and Therapeutics in Budapest 2011 through the submission of an abstract of our report to the Congress.

The following countries were approached to complete the questionnaire:Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Israel, Italy, Lithuania, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, UK and Ukraine .

Results

The response rate to the sending out of the questionnaires was very good. The majority of those approached responded immediately, while some responded after a reminder sent out in September 2011; the last two countries responded after several reminders during 2012. The response rate was 100 % overall. In some cases the questionnaire was passed on by the delegate concerned to a colleague in full possession of the national facts and figures (such as the secretary of the National Society or section). The responses from the 31 countries on our first two questions are shown in Table 1. As shown, clinical pharmacology is recognized in most countries (28) as an academic discipline in teaching and research, but only in 19 as a medical specialty with defined functions in patient care. Clinical pharmacology is recognized in 22 European countries as a medical specialty, although apparently in three of these countries without defined functions in health care. Nine countries do not recognize clinical pharmacology as a medical specialty, implying that no positions for clinical pharmacologists have been created in health care. Surprisingly, France and Italy belong to this last category of countries. The recognition of clinical pharmacology as a separate medical specialty first took place in Finland, Germany, Sweden and UK some 40 years ago, while many countries recognized this medical speciality more than 30 years ago. In the remaining countries, recognition was achieved more than 10 years ago. In recent years no new countries have entered this list (Table 2).

Table 1 Response to questions 1 and 2 of survey

Questions 1 and 2
Is there a clear definition of clinical pharmacology in your country?
Yes: 25; No: 6
a. As a scientific discipline?
Yes: 24; No: 7
b. As an academic discipline in teaching and research?
Yes: 28; No: 3
c. As a medical specialty with defined functions in patient care?
Yes: 19; No: 12
d. Is clinical pharmacology recognized as a medical specialty by your government?
Yes: 22; No: 9 (Belgium, Estonia, France, Greece, Italy, Lithuania, Slovenia, Turkey, Ukraine)

The training of a clinical pharmacologist varies between the countries. The training is predominantly in internal medicine in six countries, predominantly in clinical pharmacology in nine and dual (pharmacological and clinical) in seven countries (Table 3).

We also enquired about the number of positions in clinical pharmacology in the different countries. Only the Netherlands reported that professionals other than MDs (clinical

Table 2 Response to question on the recognition of clinical pharmacology as a separate medical speciality

Question: If the specialty of clinical pharmacology is recognized by your country as a separate medical specialty, how long ago was it recognized?
≥40 years: Finland, Germany, Sweden, UK
≥30 years: Croatia, Czech Republic, the Netherlands, Poland, Portugal, Serbia, Slovakia
>20 years: Bosnia Herzegovina, Hungary, Norway, Spain
>15 years: Austria, Denmark
5–15 years: Bulgaria, Israel, Romania, Russia, Switzerland

Table 3 Requirements of training in terms of years after internship, years in internal medicine and years in clinical pharmacology

Required training in clinical pharmacology	
Predominantly internal medicine	Austria, 6 and 3 years; Hungary, 4 and 2 years; Czech Republic, 5 and 2 years; Israel, 4 and 2.5 years; Estonia, 3 and 1 year; Slovakia, 3 and 2 years; France, 3 and 1 year; The Netherlands, 4 and1.5 years
Predominantly clinical pharmacology	Bosnia, Bulgaria, Croatia, Denmark, Germany, Italy, Norway, Portugal, Romania, Spain, Sweden
Dual pharmacological and clinical training	Finland, Poland, Russia, Serbia, Switzerland, UK

pharmacists) are recognized as clinical pharmacologists albeit without direct responsibility for patients. The question on the numbers of clinical pharmacologists revealed marked inter-country differences, ranging from 600 to <10 per country (Table 4). When the number of clinical pharmacologists per million inhabitants was calculated, nine countries had ≤1, ten had between two and four, and eight had between five and ten; four countries (Hungary, Norway, Slovakia and Sweden) reported ≥10 clinical pharmacologists per million inhabitants (Table 4).

We also enquired about the roles of clinical pharmacologists in health care in terms of both routine clinical functions and drug-related problems. The former refer to those clinical duties that do not require specialist pharmacological training to be fulfilled, implying that they are non-pharmacological in nature. Fifteen countries (50 %) reported no such functions, while nine reported considerable work in this area, mainly in internal medicine. Six countries reported small or limited work in internal medicine.

Table 5 lists the pharmacological functions undertaken by European clinical pharmacologists. The most common tasks are clinical trials, drug problem-oriented consultations, participation in Drug and Therapeutics Committees, drug information services and evaluation of adverse drug reactions. An upcoming service is pharmacogenetics consultations. Therapeutic drug monitoring is the responsibility of clinical pharmacologists in 16 countries. Among the exceptions are France, Germany, the Netherlands and UK where this task is in the hands of clinical chemists or pharmacists.

We also asked the national delegates of EACPT to answer a question about stumbling blocks in the development of clinical pharmacology in their respective country (Table 6). Eight countries reported that the underrepresentation of clinical pharmacology in pre- and postgraduate curricula for medical students and physicians is a major problem, thereby also explaining the lack of familiarity of other physicians with the knowledge and skills that can be provided by clinical pharmacologists. The low payment of clinical pharmacologists and lack of reimbursement for their intellectual services were also mentioned. Other reasons are the few consultant posts in health care and the lack of

Table 4 Number of positions in clinical pharmacology in the countries surveyed

Approximate number of clinical pharmacologists per million inhabitants	Countries
1 or <1	Belgium, Bulgaria, France, Greece, Italy, Lithuania, Poland, Turkey, UK
2–4	Austria, Bosnia-Herzegovina, Czech Republic, Estonia, Germany, Israel, Portugal, Romania, Slovenia, Ukraine
5–10	Croatia, Denmark, Finland, The Netherlands, Russia, Serbia, Spain, Switzerland
>10	Hungary, Norway, Slovakia, Sweden
Number of positions in clinical pharmacology in your country (only medical doctors should be counted)	**Number of countries**
<10	9
10–20	4
30–50	4
50–100	8
100–300	5
600	1

Table 5 Functions of clinical pharmacologists with medical training in health care

Functions	Number of countries
Clinical trials	26
Drug problem-oriented consultations	22
Drug and Therapeutics Committees	20
Drug information services	20
Adverse drug reactions	20
Pharmacogenetics consultations	19
Therapeutic drug monitoring	16
Pharmacoepidemiology and drug utilization	7
Pharmacoeconomy	4
Pharmacotherapy in pregnancy	3
Drug intoxications	2

Table 6 Stumbling blocks for the development of clinical pharmacology as a medical discipline

Stumbling blocks for the development of clinical pharmacology as a medical discipline	Number of countries
Clinical pharmacology underrepresented in pre- and postgraduate curricula	8
Lack of consultant posts in health care	6
Poor knowledge about clinical pharmacologists among clinicians and decision-makers	4
No payment for intellectual services of clinical pharmacologist	4
The non-recognition of clinical pharmacology as a medical speciality	4
Lower salary than other clinicians	3
Overcoming the resistance from pharmacology, internal medicine and pharmacy.	3
Limited interest among practicing physicians to search for external advice in drug therapy	2
Conflicting interests between clinical pharmacologists and clinical pharmacists	2
Insufficient funding for clinical pharmacologists	2

recognition of clinical pharmacology as a medical specialty. Surprisingly, some countries reported poor cooperation with experimental pharmacologists. Another problem mentioned was the conflicting interests of clinical pharmacologists and clinical pharmacists.

Finally we asked what EACPT could do to assist the countries to increase the impact of clinical pharmacology (Table 7). Eleven countries suggested international support (such as our summer schools) in the education and training of clinical pharmacologists. Most countries emphasized the need to seek European accreditation of the specialty of clinical pharmacology and to lobby nationally for the recognition of clinical pharmacology in the nine countries where it currently plays no role in health care.

Discussion

Our questionnaire is the most recent attempt to map out the development of clinical pharmacology in Europe as well as the functions of European clinical pharmacologists. By applying an approach in which we enlisted the cooperation of the senior national delegate to the EACPT Council, we have been able to reach 31 countries affiliated with EACPT. Clinical pharmacology is recognized as a medical specialty in 22 of these 31 countries. A first priority for EACPT should be to lobby for clinical pharmacology to be recognized by the European Union (EU) as a medical specialty. An application for this recognition would require approval by at least two thirds of the EU countries (18 countries). To date, 16 EU countries do recognize clinical pharmacology as a medical speciality, and six countries included in the survey are not yet members of the EU. However, Croatia (where clinical pharmacology is recognized as a medical specialty) will become a member of the EU this year, and the membership of Estonia, which has had a specialty, is pending. We are therefore close to this target.

The first collective account of European clinical pharmacology was presented by a WHO working group in 1991 where 21 countries reported on the development of the discipline accompanied by a small map of the location of clinical pharmacology units in each country [3]. This WHO

Table 7 Suggested measures for increasing the impact of clinical pharmacology

Question: What can be done to assist your country in developing clinical pharmacology?	
Response to question	Number of countries
International support of education and training in clinical pharmacology through networking, courses and international exchange programs	11
Lobbying for the recognition and accreditation of clinical pharmacology as a European medical speciality including:	
The definition of final goals for European clinical pharmacology.	
Common final examination	
Letters of support to national governments	10
Prove the value of clinical pharmacology for society, particularly in healthcare (the rational use of drugs)	5
Lobbying for research funding from European Union	3
Promote immigration of clinical pharmacologists from developed countries	2

publication was based on three articles published in the *European Journal of Clinical Pharmacology* on teaching, research and health care [4–6]. The focus at that time was on the academic aspects of clinical pharmacology, but the editors expressed the hope that this WHO-supported publication would increase the demand for clinical pharmacology in health care as well. An ambitious guide to training programs in clinical pharmacology in Europe was published by EACPT in 1999 and edited by Kim Brosen [7]. In this booklet 28 countries described their training programs in great detail, still emphasizing research and teaching. Now, 14 years later clinical pharmacology plays an undisputed role in teaching and research, but its functions in health care are still only vaguely defined and its practical application absent in many countries. This gap between the availability of academic pharmacological expert knowledge and its utilization in health care has to be bridged by new initiatives, particularly in those countries where clinical pharmacology is not yet recognized as a medical specialty.

The training of clinical pharmacologists varies between countries. There are two main categories of clinical pharmacologists in Europe, namely, those with training predominantly in internal medicine in combination with a relatively short education in pharmacology and those who are predominantly trained in clinical pharmacology. Several countries recommend a dual training in pharmacology and clinical medicine. Obviously the training has a decisive influence on the clinical duties undertaken. The former group of clinical pharmacologists is usually heavily involved in routine clinical matters predominantly in internal medicine (but also occasionally in areas such as pediatrics, geriatrics, psychiatry etc.) which do not require specific pharmacological training. The other two groups are undertaking much more specific pharmacological duties where a broad experience in clinical pharmacology is required. Clinical pharmacologists belonging to these two groups should have few difficulties fulfilling their functions in most European countries. A good example is Scandinavia where clinical pharmacologists can function well in each of the four countries thanks to their similar training.

A major problem with European clinical pharmacology is that several countries have failed to develop clinical pharmacology as a clinically useful discipline within the health care system and have focused much more on teaching and research. Common to these countries , which include France, Italy, Germany and the UK, is a marked shortage of positions in health care as opposed to posts in academia. By contrast, the majority of positions in clinical pharmacology in the Scandinavian countries and Russia are created in health care. The pharmacological services listed in Table 5 that focus on drug problems agree well with those that recently were prioritized in the IUPHAR/WHO/CIOMS manifesto [2]. A weakness is the moderate roles in drug intoxications and drug abuse, both being of considerable public health importance. Many respondents described the lack of consultant posts in health care as a major stumbling block for the development of clinical pharmacology (Table 6). This is in agreement with the conclusions drawn from a recent consensus meeting on the future of clinical pharmacology in Europe (JK Aronson and G Velo, personal communication).

We conclude that individual countries and EACPT should join forces to tackle and remove the stumbling blocks that prevent the development of European clinical pharmacology into a useful clinical specialty.

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