

# THE PHARMINE PARADIGM – MATCHING THE SUPPLY OF PHARMACY EDUCATION AND TRAINING TO DEMANDS

by Jeffrey Atkinson and Bart Rombaut

**T**he roles and responsibilities of the modern-day pharmacist are evolving very quickly, and pharmacy education and training will have to adapt in order to provide the competences needed for the new roles and responsibilities (see Figure).

The first two demands on pharmacy education and training will have an impact mainly on duration and organisation of education and traineeship.

The first demand concerns the EU directive 2005/36/EC on the recognition of professional qualifications<sup>1</sup>. The abolition of obstacles to the free movement of persons and services is one of the objectives of the EU. For nationals of the member states, this includes their right to pursue a profession in a member state other than the one in which they have obtained their professional qualifications. Access in the member states to the profession of pharmacist is conditional upon the possession of a given qualification ensuring that the person concerned has undergone training which meets the minimum conditions laid down. The main factors involved are:

- ◆ “Evidence of formal qualifications as a pharmacist shall attest to training of at least five years' duration,…”
- ◆ “...four years of full-time theoretical and practical training at a university or at a higher institute of a level recognised as equivalent, or under the supervision of a university;”
- ◆ “...six-month traineeship in a pharmacy which is open to the public or in a hospital, under the supervision of that hospital's pharmaceutical department.”

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## PHARMINE (Pharmacy Education in Europe)

The Pharmine project will examine the opportunities for the introduction of the Bologna declaration into pharmacy education and training with the aim of tuning the latter to the future needs in the three areas of pharmaceutical expertise: community, hospital and industry pharmacy.

- ◆ “The balance between theoretical and practical training shall, in respect of each subject, give sufficient importance to theory to maintain the university character of the training.”

The above factors impact mainly on duration and organisation of education and traineeship. In essence, they state that a pharmacy diploma should be given after a 5-year fully integrated course that incorporates a 6-month traineeship.

Directive 2005/36/EC also gives some indication of the subject areas to be taught: “Annex V.6. PHARMACIST 5.6.1. *Course of training for pharmacists*: Plant and animal biology/Physics/General and inorganic chemistry/Organic chemistry/Analytical chemistry/Pharmaceutical chemistry, including analysis of medicinal products/General and applied biochemistry (medical)/Anatomy and physiology; medical terminology/ Microbiology/Pharmacology and pharmacotherapy/Pharmaceutical technology/Toxicology/Pharmacognosy/ Legislation and, where appropriate, professional ethics.”

### Movement of pharmacists within EU

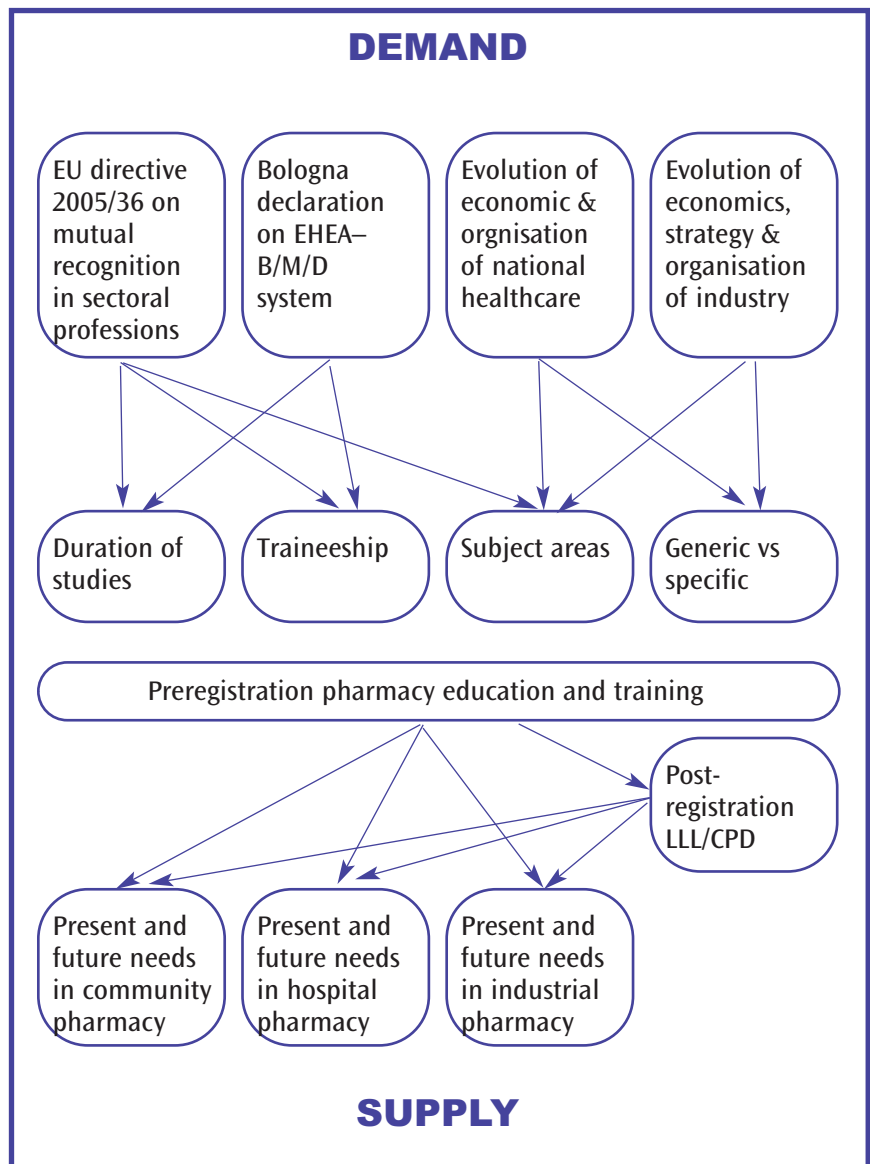
This directive is primarily concerned with the free movement of pharmacists within the EU. At the present time this probably does not involve a large number of pharmacists. For example, a survey published in 2009 by the French Council of Pharmacists found that there were 926 foreign pharmacists working in community pharmacy practice in France – out of a total of 55,523. Of the 926, 181 came from the EU, Monaco or Switzerland<sup>2</sup>. This may change in the future. The survey by the French Council

of Pharmacists reported that “10 countries (Belgium, Denmark, France, Iceland, Netherlands, Poland, Rumania, Slovakia, Slovenia, Switzerland) told us they already have a shortage of pharmacists, and 5 (Denmark, France, Latvia, Slovakia, Slovenia) today believe such will be the case 10 years from now.” Furthermore, if one judges from the EU ERAMUS scheme<sup>3</sup>, the (student) population of some countries shows more inclination to mobility than others. Comparing the 4 countries (Belgium, France, Italy, Netherlands) that founded the EU (together with Luxembourg not included as numbers are very small) in 1952, with the 8 countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia) that joined (together with Malta not included as numbers are very small), the EU in 2004, the ratio of students going abroad to that of students coming in from elsewhere is 1.0 (range 0.7 through 1.2) for the old members and 2.2 (range 1.2 through 3.4) for the new members. Whilst more mobile pharmacy students do not necessarily turn into more mobile pharmacists, the difference in the numbers is striking.

**The Bologna declaration**

The second demand on pharmacy education and training is the *Bologna declaration*. It should be noted at the outset that the Bologna declaration is a collection of principles agreed upon by several European countries but – unlike directive 2005/36/EC – it is not EU law and thus not legally binding in the EU.

The purpose of the Bologna accords is to create a framework for the construction of the European higher education area (EHEA) by making degree and quality assurance standards comparable and compatible throughout Europe. It was signed in Bologna in 1999 by the ministers of education from 29 European countries<sup>4</sup>. The Bologna declaration concerns all university



**Figure.** The PHARMINE paradigm – matching pharmacy education and training to demands.

EHEA: European Higher Education Area; B/M/D: bachelor/master/doctorate; LLL: lifelong learning; CPD: continuing professional development

degrees not only pharmacy. Albeit it could have a varying impact on pharmacy education.

Some principles such as "Adoption of a system of easily readable and comparable degrees" (implying that countries should adopt common terminology and standards) are relatively neutral in their impact.

Other principles such as the adoption of an ECTS (European Credit Transfer System) system of

credits with links to LLL (lifelong learning) could have a positive impact on, for instance, the links between pre- and post-registration training.

Other principles are more problematic: "Adoption of a system essentially based on two main cycles, undergraduate and graduate. Access to the second cycle shall require successful completion of first cycle studies, lasting a minimum of three years. The

degree awarded after the first cycle shall also be relevant to the European labour market as an appropriate level of qualification."

Thus the Bologna principles divide university education into undergraduate (bachelor, 3 years) and postgraduate (master, 2 years. At a later stage doctorate, 3 years' duration was brought in). One of the objectives of the PHARMINE consortium is to evaluate whether and/or how this is relevant to the long (5 years) integrated course of pharmacy education and training, or whether there has to be an exception in the case of training for sectoral professions such as pharmacy.

The Bologna principles will have an impact mainly on the organisation of pharmacy courses. The two final demands on pharmacy education and training to be considered will have an impact mainly on the subject areas taught and the equilibrium between generic and specific subjects and skills.

### Community and hospital pharmacists

The third demand on pharmacy education and training stems from the fact that several European countries are reflecting upon ways to develop the services offered by community and hospital pharmacies in order to strengthen the *roles and responsibilities of community and hospital pharmacists in the national healthcare system*. Such developments will inevitably have an impact on pharmacy education and training.

Some of the areas in which community and hospital pharmacists may play a greater role in a given national healthcare system<sup>5,6</sup> include:

- ◆ Provision of new pharmaceutical services in risk management, testing and/or management of chronic health problems such as: smoking, heart disease,

hypertension, diabetes, obesity, chronic renal disease, asthma...

- ◆ Evaluation of and reporting on medicines and medical devices in areas such as: clinical research, pharmacovigilance, efficacy and adverse effects of medical devices...
- ◆ Evaluation of and reporting on issues of public health such as development of resistance to anti-microbial drugs...
- ◆ Advice to special groups such as: international travellers (vaccinations, disease prevention), young mothers (baby foods), athletes (nutrition)...
- ◆ Establishment of evidence-based medicines and therapy
- ◆ Development and running of systems of telemedicine
- ◆ Provision of basic first aid
- ◆ Interaction between community pharmacies and residential care homes

The ways in which the above changes in pharmacy practice may impact on pharmacy education and training include:

- ◆ Introduction of new subject areas such as pharmaceutical care. The latter can be defined as the responsible provision of therapy for the purpose of achieving definite outcomes that improve a patient's quality of life: cure of a disease, elimination of symptomatology, slowing of a disease process, prevention of a disease or symptomatology. It implies direct involvement of the pharmacist in the healthcare team responsible for the design, implementation, and monitoring of a therapeutic plan.
- ◆ A change in the importance of generic subjects and skills such as management and information technology, and in that of certain specific subjects such as statistics and experimental design, gerontology...

- ◆ Reflection on the possible introduction of a period (e.g. 1st year) of common studies with students in other healthcare professions (medicine, nursing...) in order to create ties between the different members of the healthcare system.

Hospital pharmacists are part of the medication management team in hospitals that is responsible for how medicines are selected, procured, delivered, prescribed, administered in order to optimise the contribution that medicines can make to producing desired outcomes. Albeit, the specific roles and responsibilities of hospital as opposed to community pharmacists need clarification in some countries. Once this is done pharmacy education and training will again have to adapt to the new situation.

As national healthcare systems differ in the EU, the ways in which the roles and responsibilities of community and hospital pharmacists are elaborated and defined will differ according to local conditions. So to some extent will the education and training judged necessary to obtain the competences required for such roles and responsibilities.

### The pharmaceutical industry

The fourth demand on pharmacy education and training stems from the *rapid changes in the pharmaceutical industry*<sup>7,8</sup>. Change is dictated by several developments:

- ◆ As the population ages new medical needs emerge and generate a different disease burden (e.g. the growing need for treatment of neurodegenerative diseases like Alzheimer's). The so-called "grey factor" will also globally boost the need for new medicines as the elderly are often under poly-medication.
- ◆ As the E7 countries (Brazil, China, India, Indonesia, Mexico, Russia and Turkey) develop

economically, their disease burden changes (e.g. emergence of chronic cardiovascular conditions such as heart disease and hypertension) and thus so do their medical needs. Their increase in wealth also means that they play an increasingly important role in pharmaceutical marketing and economics.

- ◆ Global warming will have a major impact on disease patterns. It may bring previously eradicated diseases such as malaria and cholera back to countries in Southern Europe. It could boost the production of pollen and so aggravate respiratory illnesses. Small rises in temperature will modify bacterial growth and hence change microbial disease patterns. The examples are numerous.

In the face of these and other challenges, the pharmaceutical industry suffers from a lack of productivity in the lab. Costs in R&D soar but fewer and fewer innovative medicines are produced.

Furthermore, healthcare agenda and politics – no longer scientific advancement – have a major impact on the development of pharmaceuticals.

All the above factors are modelling the face of the industry as it moves away from the “old” system of big pharma with innovation and production based on chemical synthesis, towards one of small and medium enterprises (contract research organisations and the likewise that are often developed by universities), with innovation and production based on biotechnology.

This will impact upon education and training for industrial pharmacists. Changes will be required in the generic subjects and skills behind the competences in fields such as management. New fields of expertise are emerging such as legislation on intellectual property – the latter being of prime importance in various biotechnological fields such as cell therapy, and allo- or xeno-transplantation. This could produce “double competence” study programmes such as pharmacy plus business management or pharmacy plus patent law.

There will also be a need for a change in subject areas. Here the strategy to be adopted is very hard to discern. Although the elucidation of the human genome revealed many opportunities for the industry (e.g. over 800 new drug targets in the form of G-protein coupled receptors), and the “-omics” thrived in higher education institutions and elsewhere, this did not produce the pharmaceutical revolution hoped for. With hindsight, perhaps too much time was spent in faculties on studies in genetics and genomics - before reality hit home. If in the future, education and training is to produce the right industrial pharmacist specialist at the right time, given the long-term nature of drug R&D, changes in curricula have to be made a decade before their fruits can be seen.

The PHARMINE consortium<sup>9</sup> is looking at how the pharmacy education and training supplied by European universities meets the above demands and how it will

have to be modified in order to meet the challenging, future demands.

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*With the support of the Lifelong Learning Programme of the European Union (142078-LLP-1-2008-BE-ERASMUS-ECDSP).  
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