



Education in Pharmacy

Purposes, knowledge and identities



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SVEUČILIŠTE U
ZAGREBU

Pharmacy facts

- Pharmaceutical sciences are in biomedical sciences.
- Faculties of pharmacy are in biomedicine, among biomedical faculties.
- Physician, nurse and pharmacist are key health professionals – without them health care can not be delivered.

Thinking about...

- Where we were in the past?
- Where are we now?
- Where are we going?
- Where we will be or could be in the future?

PHARMACY PRACTICE

- Long and proud tradition
- Pharmacist is drug expert from the very beginnings, and still is
- Pharmacists are valued, trusted, and respected members of their communities playing many different roles



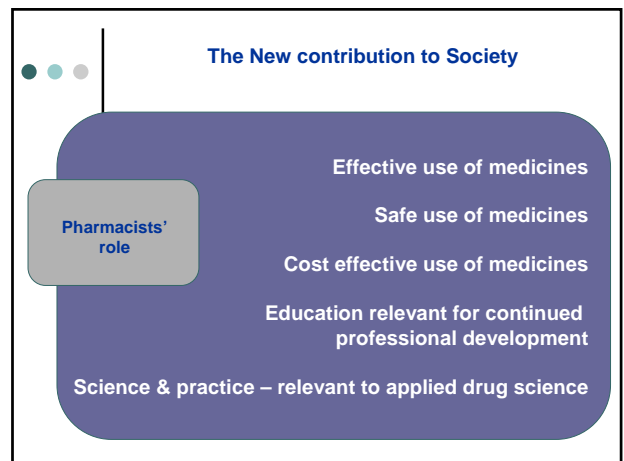
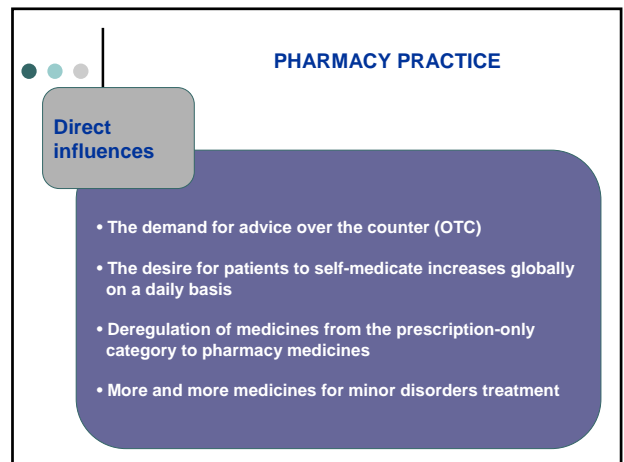
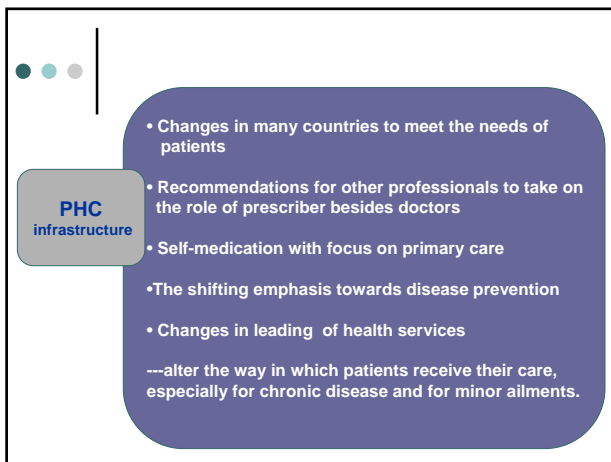
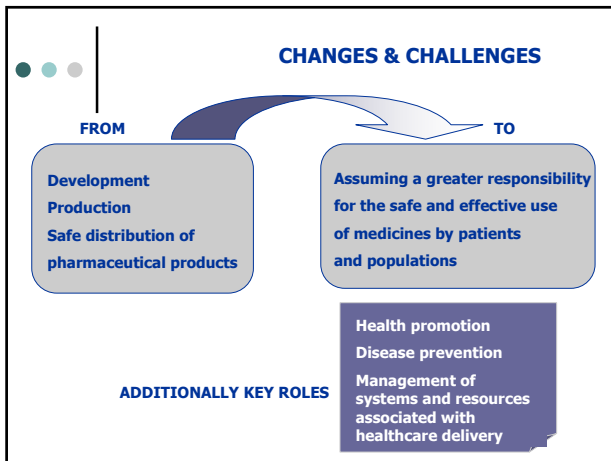


Professional purpose

to serve the needs of the society through the practice, at an individual patient or consumer level and the wider population level.

Pharmacy profession

- Has undergone a change in the way it is practised
- It is a consequence of technological advances
- Contribution to changes in the nature of health care delivery



TO MEET THE NEEDS OF SOCIETY

Imperative for pharmacy education

Greater level of knowledge and understanding

- about commonly occurring medical conditions
- new drugs and therapies
- key concepts and strategies to prevent medication error especially of
DRUG SAFETY (pharmacovigilance)
PROCESS SAFETY (preventing medication errors in healthcare)

For the sake of patient safety and obtaining the best therapeutic outcomes.

Focus on

Effective education

Evidence based practice

Knowledge, skills, competence

Expected outcomes

Quality of care to society

Safety of medicines

Cost effective use medicines

Competencies for the future

Pharmacist as break-dancer




The need for reconstruction of education

DRIVING MACHINE


- Knowledge and data expansion
- The progressing profession
- Social and cultural shifts

Does pharmacy education meet these changes and challenges?

NOT always

- Varies in many countries
- Traditionally, education has been a strong driver of change in practice, but sometimes it may lag behind the needs of practice

DIVERSITIES



- Different type of schools
- Different emphasis on certain content
- Different pedagogical approach
- Different standards
- Different length of education
- Different titles of qualification

PHARMACY FROM TECHNICAL TO CLINICAL PROFESSION

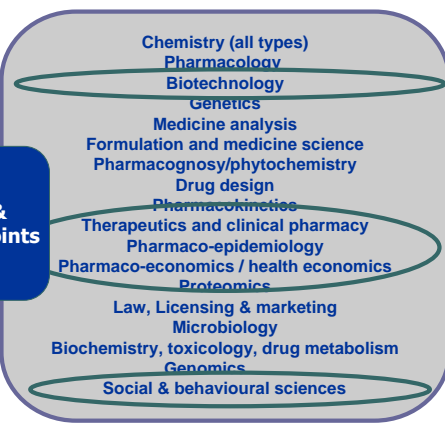
CURRICULUM

- adopted in many countries to new educational needs
 - still heavily loaded with emphasis on science
- traditional disciplines - distinct with independent outcome

A focus have to be

- upon professional relevance and vocational outcomes
 - patient focussed and clinical
- high regard for clinical learning and for integrated workplace experience

Identity & New focal points



Chemistry (all types)
Pharmacology
Biotechnology
Genetics
Medicine analysis
Formulation and medicine science
Pharmacognosy/phytochemistry
Drug design
Pharmacokinetics
Therapeutics and clinical pharmacy
Pharmaco-epidemiology
Pharmaco-economics / health economics
Proteomics
Law, Licensing & marketing
Microbiology
Biochemistry, toxicology, drug metabolism
Genomics
Social & behavioural sciences

GLOBAL LEVEL

FIP & WHO INITIATIVES

- Established joint FIP/WHO Pharmacy Education Task force group
- FIP/WHO (Salvador 2006) 1st Global Pharmacy Education consultation
- Action Plan (2007-2009)
- 2nd Global PE consultation (Peking 2007)

AIM OF CONSULTATIONS

- To develop a collaborative global framework
- To quantify the required pharmacy workforce levels
- To develop models to build training capacity for the scaling up pharmacy education and training.
- To provide technical support for country level action and human resources for health planning to ensure the provision of essential pharmaceutical services and care.

Participants at 2nd Global Pharmacy Education Consultations have voted for Action Plan in Peking (China) 2007, www.fip.org



EUROPEAN LEVEL
Higher education trends in EU
 Bologna & European Higher Education Area (EHEA)

EHEA (2010) via...

Bologna process

"easily readable and comparable degrees"

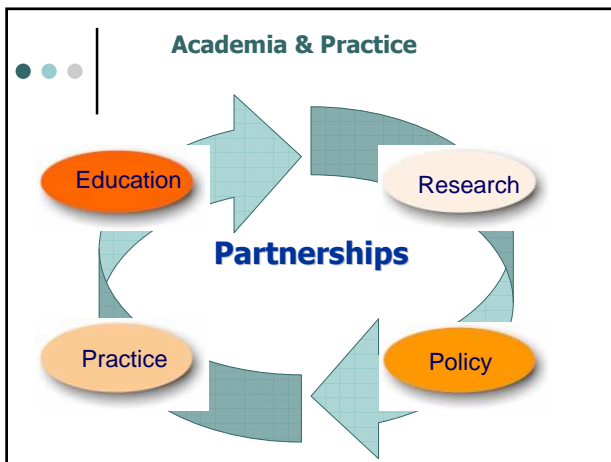
"adoption of a two UG cycle system", and doctoral studies as 3rd PG cycle

"establishment of a system of credits"

FOCUS ON

DELIVERY AND TEACHING TRENDS IN

Research
 Evaluation
 Teaching
 Mentoring & training
 Evidence-based practice



DIRECTIVE 2005/36/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 7 September 2005. Anex. V.6. PHARMACIST
 5.6.1. On the recognition of professional qualifications/Course of training for pharmacists

1. Plant and animal biology
2. Physics
3. General and inorganic chemistry
4. Organic chemistry
5. Analytical chemistry
6. Pharmaceutical chemistry, including analysis of medicinal products
7. General and applied biochemistry (medical)
8. Anatomy and physiology; medical terminology
9. Microbiology
10. Pharmacology and pharmacotherapy
11. Pharmaceutical technology
12. Toxicology
13. Pharmacognosy
14. Legislation and, where appropriate, professional ethics.

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.

How relevant are directives 2005/36/EC and 85/432/EEC to current professional needs?
 Debate of directives is timely.

BOLOGNA AT
FACULTY OF PHARMACY AND BIOCHEMISTRY
 University of Zagreb

UG PROGRAMMES
 Pharmacy studies
 Medicinal biochemistry

UG 2005/06
 5 Years, 1 cycle,
 300 ECTS

PG 2007/08
 3 Years, 180 ECTS

Titles:
 Master of pharmacy
 Master of medicinal biochemistry

DOCTORAL STUDIES - BIOMEDICINE AND HEALTH
 Pharmaceutical and Biochemical Sciences

Title: Dr. sc. (Ph. D.)

PG PROFESSIONAL STUDIES & SPECIALISATIONS
 In process

ZAGREB REFORM

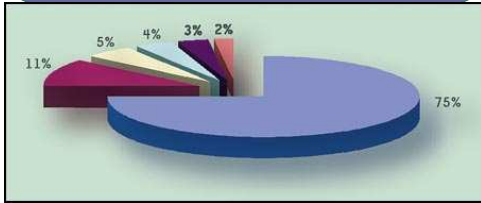
STRATEGIC DIRECTIONS

- to integrate the UG curriculum with practice
- to develop pharmaceutical care skill base
- to develop education, training and research as a means to improve health outcomes

Directives & Recommendations
 EC, EFPA, FIP, EuroPharm Forum WHO/EURO, PGEU, PCNE,....

**PHARMACISTS
IN CROATIA**

Community pharmacists (70%)
Hospital pharmacists (5%)
Industry and represent. agencies (11%)
Whole sales (5%)
Education (4%)
Community health institution (3%)
Other (2%).



TEMPUS
Education and Culture
EC Directorate-General

www.tempuspharmacy.org

ECR – European Council requirement on the recognition of professional qualifications

1st Year

Code	Subject	Status	Hours	ECTS
F1-01	Introduction to pharmacy	O	15	1
F1-02	Mathematics	O	60	4.5
F1-03	Cell biology and genetics (ECR 1)	O	75	5.5
F1-04	Sociology and health	O	30	2.5
F1-05	General chemistry and stoichiometry (ECR 3)	O	135	10.5
F1-06	Physiology and human anatomy (ECR 8)	O	105	8
F1-07	Pharmaceutical botany	O	75	5.5
F1-08	Physics (ECR 2)	O	75	6
F1-09	Statistics	O	30	2.5
F1-10	Analytical chemistry* (ECR 5)	O	75*	5.5
F1-11	Organic chemistry* (ECR 4)	O	45*	3.5
F1-12	Pharmacy practice	O	15*	1
F1-70	Sports education (30 hours per semester)			
F1-43	History of pharmacy	E	15	1
F1-44	First aid and safety measures in laboratory	E	15	1
F1-45	Communication skills	E	15	1
F1-46	Psychology	E	15	1

Pharmacy practice, from 1st to 5th year

2nd Year

Code	Subject	Status	Hours	ECTS
F1-10	Analytical chemistry* (ECR 5)	O	60*	4.5
F1-11	Organic chemistry* (ECR 4)	O	90*	7
F1-13	Biological chemistry	O	45	3.5
F1-14	Physical chemistry	O	135	10.5
F1-15	Microbiology and parasitology (ECR 9)	O	90	7
F1-16	Biochemistry* (ECR 7)	O	30*	2.5
F1-17	Pathophysiology and pathology	O	60*	4.5
F1-18	Pharmacognosy* (ECR 13)	O	75*	5.5
F1-19	Medicinal/Pharmaceutical chemistry* (ECR 6)	O	120*	10
F1-12	Pharmacy practice	O	15	1
F1-70	Sports education (30 hours per semester)			
F1-47	Selected methods of instrumental analysis	E	45	4
F1-48	Methods of physical chemistry in biomedical research	E	30	2.5
F1-49	Pharmaceutical and medical terminology (ECR 8)	E	15	1
F1-50	Health ecology	E	15	1
F1-51	Bioethics (ECR 14)	E	15	1

3rd Year

Code	Subject	Status	Hours	ECTS
F1-16	Biochemistry* (ECR 7)	O	60*	4.5
F1-17	Pathophysiology and pathology*	O	30*	2.5
F1-18	Pharmacognosy* (ECR 13)	O	90*	7
F1-19	Medicinal/Pharmaceutical chemistry* (ECR 6)	O	45*	4
F1-20	Analytical toxicology (ECR 12)	O	60	4.5
F1-21	Pharmaceutics (ECR 11)	O	105	8
F1-22	Molecular biology and genetic engineering	O	75	6
F1-23	Nutritional biochemistry (ECR 7)	O	60	4.5
F1-24	Clinical biochemistry and hematology (ECR 7)	O	75	6
F1-25	Pharmacology* (ECR 10)	O	45	3.5
F1-26	Drug formulation* (ECR 11)	O	30*	2.5
F1-12	Pharmacy practice	O	15	1
F1-52	Isolation of natural bioactive products (ECR 13)	E	30	2.5
F1-53	Spectroscopic identification of organic compounds	E	30	2.5
F1-54	Pharmacy informatics	E	30	2.5
F1-55	Health legislation** (ECR 14)	E	15	1
F1-56	Health economics**	E	15	1

4th Year

Code	Subject	Status	Hours	ECTS
F1-25	Pharmacology* (ECR 10)	O	90*	9
F1-26	Drug formulation* (ECR 11)	O	75*	7.5
F1-27	Pharmaceutical analysis (ECR 6)	O	135	14
F1-28	Drug biochemistry (ECR 6)	O	90	9
F1-29	Cosmetology	O	60	6
F1-30	Prescription pharmacy	O	45	4.5
F1-12	Pharmacy practice	O	15	1
F1-57	Phytotherapy (ECR 13)	E	30	3
F1-58	Experimental pharmacology (ECR 10)	E	30	3
F1-59	Applied microbiology (ECR 9)	E	30	3

5th Year

Module 1. Drug Research and Development				
Code	Subject	Status	Hours	ECTS
F1-31	Selected topics in medicinal/pharmaceutical chemistry (ECR 6)	O	30	3
F1-32	Drug design	O	45	4.5
F1-33	Biochemical basis of endobiotics and xenobiotics toxicity (ECR12)	O	30	3
F1-34	Novel drug delivery systems (ECR 11)	O	30	3
F1-35	Analytics of development of pharmaceutical products	O	15	1.5
F1-36	Quality assurance and registration of drugs	O	30	3
Module 2. Pharmacy				
Code	Subject	Status	Hours	ECTS
F1-37	Social pharmacy	O	15	1.5
F1-38	Clinical pharmacy	O	30	3
F1-39	Pharmacotherapy (ECR 10)	O	45	4.5
F1-40	Pharmaceutical care	O	90	9
Obligatory subjects for both modules				
F1-41	Research methodology	O	15	1.5
F1-42	Diploma work	O	150	15
F1-12	Pharmacy practice	O	150	15

Additional elective courses

Elective subjects				
Code	Subject	Status	Hours	ECTS
F1-60	Biostatistics	E	30	3
F1-61	Metalloproteins – structure and mechanism	E	20	2
F1-62	Molecular basis of diseases and therapy	E	30	3
F1-63	Molecular pharmacology (ECR 10)	E	30	3
F1-64	Pharmacogenetics	E	30	3
F1-65	Individual health care	E	20	2
F1-66	Dietotherapy	E	30	3
F1-67	Industrial pharmacy	E	30	3
F1-68	Pharmacy ethics and deontology (ECR 14)	E	15	1.5
F1-69	Sociology in pharmacy	E	15	1.5

Changes and challenges

- Reduction of teaching hours in some general subjects
- Introduction of new contents related to practice and science (~30 new subjects in total)
- Increasing in pharmaceutical (10%), biomedical (15%) and humanistic (6%), and decreasing of general subjects (10%)

Consequences and still opened questions

- Programme comprises 3525 teaching hours in total
- ~ 40 Obligatory courses
- ~ 30 Elective courses is offered, student need to elect ~ 18

TODAY STUDENTS – TOMORROW PHARMACY PRACTITIONERS

STUDENTS

- Summer Schools
- Symposia
- Congresses & conferences
- PharmaCon project
- Students' Exchange Programme
- Students mentorships

Congresses and Conferences/Oncology pharmacy in Croatia/Students participation

- 1st Congress of Croatian Society of Medical Oncology of CMA /1st Course of Oncological Pharmacists (Opatija 2003)
- 3rd Croatian Congress on Pharmacy (Cavtat/Dubrovnik 2005)
- Croatia meeting for Oncology pharmacy (Osijek 2007)
- PharmaCon 2007 (Dubrovnik 2007)

SUMMER SCHOOLS

Obonjan
Zadar
Dubrovnik



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