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*Pregledni članak¹
Review article*

EDUCATION AND TRAINING PROGRAMMES OF THE IFCC IN CLINICAL CHEMISTRY AND LABORATORY MEDICINE

Improving the quality of professional practice in Laboratory Medicine

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Summary: When quality is referred to in clinical chemistry and laboratory medicine, the focus is mainly on the analytical process. But good professional quality starts with a sound education. In an attempt to describe the practice of clinical chemistry and laboratory medicine in the 15 member states of the »old« European Union, it was noticed that (sometimes) large differences existed in the way professionals are being trained (see: Sanders et al, Clin Chem Lab Med 2002; 40: 196–204). With that outcome, a survey of the Websites of the different Member Societies and Corporate Members of IFCC was conducted. It showed that less than one third of either two groups paid attention to, or offered, education. This led to a series of questions to a non-representative group of colleagues outside the former EU who were willing to give more insight in the educational system of their country. All colleagues were known to be involved actively in clinical chemistry and laboratory medicine. The outcome did not give a uniform pattern, since every country regulates health care in its own way, according to its own historical development, needs, social vision, etc. From that a number of conclusions have been drawn:

- a. Proper University Training is required to enter vocational training
- b. Regulated Vocational Training seems to be necessary (4 years)
- c. A clear Syllabus as an indicative guide to the vocational training is important
- d. Management training should be included since a clinical chemist will have organizational responsibilities as well
- e. Examinations may help in improving the quality of the education
- f. Official Register, recognized by Law, is essential, but not always existing
- h. Re-Registration can be seen as part of the Quality Cycle.

Finally, some attention is being paid to the activities of the EMD. This Division of the IFCC provides the membership of IFCC and the health-care community with education which it considers relevant to Clinical Chemistry and Laboratory Medicine. It is the intention of EMD to improve the quality of the profession by educational activities in molecular biology, evidence based laboratory medicine, quality assurance, distance education, and laboratory management. Specific projects are a Master Course in Laboratory Science, a course in Flowcytometry, and the Visiting Lecturer Program which supports national societies in inviting lecturers on specific topics. More information can be found on the IFCC Web-site (www.ifcc.org). In the future, it is to be expected that emphasis on education in our profession will be on the clinical use of tests, modern media and e-learning, and specific courses in new technologies. EMD works continuously to improve the quality of clinical chemistry and laboratory medicine. The input from all National Societies is appreciated to discern topics most relevant to the membership of IFCC.

Key words: education, training, clinical chemistry, laboratory medicine, IFCC-EMD

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Introduction

During many years prominent focus of clinical chemistry has been on research, scientific and technical developments, and quality and quality improvement as tools to improve patient care. Without doubt these issues represent the way forward in the performance of our laboratories.

Still another factor is of unmistakable importance for, finally, the well-being of patients, and that is a good (continuous) education. This not only holds for clinical chemists themselves, but for everyone forming the population of our laboratories.

The International Federation of Clinical Chemistry and Laboratory Medicine has recognized this necessity for a long time. Since 1967 it has already an Education (and Management) Division (EMD, at that time as part of IUPAC).

Most National Societies of the so-called developed countries continuously offer their members high level education in clinical chemistry. This starts at the training of clinical chemists and is continued during their professional life. Within the framework of IFCC a number of these societies have sent their most talented lecturers abroad for courses and lectures to train professionals in the developing countries. This article is meant to review the present status and goals of the educational activities of the EMD and all its Committees and Working Groups.

Education in relation to Quality

When looking for a definition of quality one learns that quality is the degree to which defined needs are fulfilled, or the needs and expectations of users and customers (here: clinicians and patients) are satisfied. In these definitions quality mostly is interpreted in a more strict sense, i.e. the reliability of a test result. But there is more to obtain a test result that really satisfies the need of our patients. The education of professionals and their co-workers is another guarantee that the test result will be as reliable as possible. That is interpreted by the ISO/DIS quality manual 15189. There it says under chapter 5 Technical Requirements:

»5.1 Personnel

5.1.3 The laboratory shall be directed by a person or persons having executive responsibility and the competence to assume responsibility for the services provided

NOTE *Competence* is here understood as the product of basic academic, postgraduate and continuing education, as well as training and experience of several years in a medical laboratory

5.1.9 There shall be a continuing education program available to staff at all levels«

When we look in a broader perspective, roughly the following main activities can be discerned for a clinical chemistry laboratory:

Research: Fundamental and Applied Research

Analytical Aspects: Total Analytical Process

Clinical Aspects: Interpretation and Advice: Link between Bench and Bed

Management and Organization: Financial, Personnel, Logistics Management

Education: (Post-Graduate) Training, Continuous Education.

All these aspects together will support the quality of a laboratory.

How did we, within clinical chemistry, support education in the last few years?

To answer the question on the different forms of education in clinical chemistry one may take various approaches. One way is to survey the Web-sites of IFCC National Societies and Industry in relation to education in clinical chemistry.

In a survey of the 74 Web-sites of the IFCC Full Member Societies, only 23 give information on education, such as training schemes, continuing education, information for patients (for example *Lab Test on Line*). Looking at the Web-sites of the 31 IFCC Corporate Members, educational information to clinical chemists was available on 8 sites.

The conclusion on this rough survey may be that education is considered to be of limited importance in the professional practice of Clinical Chemistry and Laboratory Medicine. I do not think that we have a low esteem of this essential part of our daily practice, but still there should be a common interest of National (Regional) Societies and Industry in education in clinical chemistry for the sake of the profession.

This should be aimed at professionals, our co-workers in the laboratory, and at the General Public.

It is my opinion that, except for a limited number of activities, we do not pay enough attention to the General Public (our 'clients'). Everyone can tell you what a doctor, a pharmacist, or a radiologist is doing. The importance of our activities for healthcare is not well recognized nor appreciated. That should change and here is a clear role for IFCC, the National Societies, and Industry.

Content and structure of Education

More than ten years ago, we started a survey within the (old) EÜ about the education in Clinical Chemistry and Laboratory Medicine. It was recogni-

zed at that time that healthcare and the related medical professions had all developed according to national laws, schemes and rules. Accordingly, so did laboratory medicine and its training. Many years of good co-operation have led to a common outcome and that may be seen as a great step forward. This was reported in 2002 (Sanders et al, CCLM 2002; 40: 196–204).

In summary, one can say that in the vocational training all elements of the profession should be addressed – in such a way that the outcome of the specialist training is a common one, irrespective of the university education at the start of the training – leaving undisturbed the national values of healthcare as they have developed over the years. Local differences (Blood banking, Microbiology) will always remain.

This excellent co-operation between the national Societies within the EU has led to the EC4 syllabus, which is not intended as a training guide for individuals but a description of a minimal training program and an indication of the level of content of National Training Programs to obtain adequate knowledge. (The EC4 Syllabus for Postgraduate Training in Clinical Chemistry and Laboratory Medicine, Bousquet et al CCLM 1999; 37: 1119–1127).

In other countries or regions not many Official Syllabi exist. On the Web one may find examples in Sweden, Canada, and Mexico.

Then a rough survey was performed on Clinical Chemistry and Laboratory Medicine Education in some other IFCC Member Countries. The main conclusions are as follows:

- School systems are comparable in different countries – entrance to University usually starts at age 18.
- University Training thought necessary to enter Clinical Chemistry and Laboratory Medicine Education mostly is Masters, MD, PhD, or Pharmacy (it is exceptional to allow a Bachelor Degree); PhD sometimes is recommended.
- In a few countries only MDs can enter profession, but this is becoming an exception. In practice clinical chemistry and laboratory medicine is a common playground for MDs and PhDs.
- Length of University training is usually 5–6 years; for MDs 5–6 years + internship (1 year). A PhD may take some extra 4 years.
- Nowhere a separate University program in Clinical Chemistry and Laboratory Medicine exists, with maybe one or two exceptions. The training may be part of a larger curriculum »Clinical Chemistry and Molecular Biology«, »Laboratory Medicine«, or »Medical Laboratory Sciences«. Thus, no University degree in Clinical Chemistry and Laboratory Medicine exists.

- Vocational Training (post-graduate training) in Clinical Chemistry and Laboratory may vary in different countries:
 - In a number of Countries no Formal Training exists. Training 'On the Spot' and experience may earn the Title Clinical Chemist. Another route is via Research Interests (PhD) or Industry.
 - When an official training is required, this may range from 1–5 years in different forms: in an (Accredited) University (Medical School), combined Medical School and (University) Hospital, or (Accredited) Hospital Laboratory.
- Official examinations can be part of the Vocational Training and these may be a condition to enter the Official Register.
- After fulfilling the pre-defined conditions for training and (official) registration, it is interesting to see in how many countries an official register exists. In a few countries there are no Registers at all; in many countries Registers for Clinical Chemists exist, more for MDs than Scientists. They are mostly controlled directly or indirectly by the Government; keeping the MD Register usually is delegated to the national Medical Association.
- Only in a minority of countries the profession is regulated by Law. In that case a different position may be seen for MDs and Pharmacists.
- Re-Registration is no common practice. This system, put into practice in a limited number of countries, should be the basis for a further improvement in quality in our profession.
- An official registration not automatically forms the basis for the position as head of the laboratory. But, in the majority of countries this is common practice.

Conclusions for this part:

1. IFCC should aim at the highest quality of professional practice;
2. IFCC should offer education to ensure well qualified heads of laboratories;
3. Since Professionals should be Heads of Laboratories, a good Management Training is essential;
4. Elements to guarantee professional quality: Proper University Training (no BSc); Regulated Vocational Training (4 years); Clear Syllabus (according to local practice); Management included; Examinations; Official Register (recognized by Law); Re-Registration.

Education and Management Division (EMD) of IFCC

This inventory and others, form the basis for the actions of the EMD.

EMD aims to improve the quality of Chemistry and Laboratory Medicine Worldwide by raising the professional level of all colleagues, especially those in developing countries, for the well-being of all patients trusted to our services (Fulfilling the defined needs).

Like all in all Divisions of IFCC, a lot of the work is being done in Committees and Working Groups. Developing countries are getting the largest attention of the Division. In general, it may be said that activities consist of defining teaching programs, indicating where to find essential texts and Web-sites, teaching new techniques, offering courses and/or symposia, and providing Visiting Lecturers.

Below, the main tasks of the Committees and Working Groups will be summarized.

Committee on Molecular Biology Curriculum

Activities: Courses in Clinical Molecular Biology Techniques: 2nd Course July 2004 Milan, Italy; Symposia at International Congresses: Glasgow 2005: »Genotyping in the postgenomic era«; Educational Material.

Committee on Analytical Quality

Activities: Education in relation to Analytical Quality. Education Courses EQA/IQC; Management in relation to analytical quality; Establishment of EQA; Serum Donation Project requests (SERO); Regional Promotion of EQA; Perth APCCB Seminar EQA in Asia/Pacific Region; Standards.

Committee on Evidence Based Laboratory Medicine

Activities: Evidence Based Guideline Development; Assessment of Quality of Evidence Based Guidelines; Database on Systematic Reviews, last update: October 2004, 435 reviews (www.ifcc.org); Cooperation with Cochrane Collaboration; External Quality Assurance of Test Interpretation; Training & Education (symposia, lectures, articles).

Many educational activities at international congresses.

1st IFCC/FESCC EBLM Course: 4 days in September 2005, Budapest, Hungary – Postgraduate curriculum on EBLM.

Publication of EBLM teaching materials.

Committee on Education and Curriculum Development

Activities: Research Methodology for Students in Developing Countries; Questionnaire; Master Cour-

se in Clinical Laboratory Science (La Plata Program); Working Group on Distance Education (WG-DE).

Working Group Master in Clinical Laboratory Science (La Plata Course).

Project Description: Two Year Graduate Course in Laboratory Medicine as a joint initiative of IFCC and the Universidad Nacional de La Plata (UNLP), delegated to C-ECD. The course leads to a Master's Degree in Clinical Laboratory Sciences.

2nd cycle (2002–2004) of Masters Program is finished.

Based on the experience from the Masters Program in La Plata, a Handbook has been published by C-ECD and WG-La Plata. This may serve as a blueprint for such a program in other regions (Fink and Allen, CCLM 2003; 41: 1379–1386).

Working Group on Distance Education (WG-DE)

Activities: Define portal re IFCC; Develop IFCC portal, including process to change information regularly; Select material from societies' websites to put on IFCC portal – starting December-04.

Visiting Lecturer Program (VLP). Supported by DPC and Dade-Behring.

Mission: to promote and share knowledge and skills (professional, technical, managerial and educational) in Clinical Chemistry with all National Societies of the IFCC.

National Societies may request a Visiting Lecturer to lecture in their country on topics relevant to their membership. EMD is very glad that the interest for this program is growing. Consequently, more lecturers are requested and sent out.

Committee on Clinical Laboratory Management

Activities: promoting Laboratory Management in developing countries.

2004: Monograph on Management of Change.

Working Group on Flowcytometry.

EMD wishes to offer more Courses on Modern Technologies and Flowcytometry is one of them.

New Course Planned for Sept. 2005 (Bremen, Germany), Symposium and Wet-lab Sessions. IFCC, University of Mainz, and Beckman-Coulter co-operation.

Working Group on the Review of Educational Materials.

Judgement of Educational Materials offered to IFCC; At present not many materials offered.

Working Group on EPO Therapy.

Activities: Laboratory Management of r-HuEPO Therapy: Guidelines for Assessment of the Optimal Therapeutic Approach. Treatment, Monitoring, Best Practice Guidelines, Tests for Patient Selection.

The way forward in education in clinical chemistry

After having given this short overview of the EMD, it is important to pay some attention to EMD in the Years to Come. This is done in the following sentences:

Bring clinical chemistry education to the basis where direct contacts with patients are; Focus on Developing Countries, Attention to Asian Pacific Region; Presence at Regional and International Congresses; Follow the needs of the IFCC Membership; Lessons from Questionnaire on Education. Important topics: Case-based learning tools, Evidence Based Laboratory Medicine, Quality Control and Quality Assurance, Test Interpretation, Laboratory Management/Financial Management, Pre-analytical effects on test results; Teaching Specific (Technical) Know-

ledge: Clinical Molecular Biology, Flowcytometry, Mass Spectrometry.

Consequently, the activities of EMD are changing. In the Old Days the main topics were: Standardization, Education, Curriculum Development, and Publications.

Now EMD is focussing on issues such as: Clinical use of Tests, Indication and Interpretation, Expand Relationships with Clinicians and Patients, Modern Media, Distance Education, »Technical« Courses, Developing Countries, Role of Corporate Members, and Quality of Education.

Final remarks

This article represents a short personal vision on education in clinical chemistry and laboratory medicine. Many ways may lead to providing sound tools to clinical chemists to practice their profession in the best possible way. Whatever route will be followed, the main goal should be to raise the level of clinical chemistry, for the profit of patient care.

IFCC EDUKACIJA I PROGRAMI OBUČAVANJA U KLINIČKOJ HEMIJI I LABORATORIJSKOJ MEDICINI

Poboljšanje kvaliteta profesionalne prakse u laboratorijskoj medicini¹

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Kratak sadržaj: Kada se govori o kvalitetu u kliničkoj hemiji i laboratorijskoj medicini težište je uglavnom na analitičkom procesu. Međutim, dobar profesionalni kvalitet zavisi od dobrog obrazovanja. U pokušaju da se opiše praktikovanje kliničke hemije i laboratorijske medicine u 15 članica »stare« Evropske zajednice, uočava se da (ponekad) postoje velike razlike u načinu na koji su stručnjaci pripremljeni za izvršavanje svojih zadataka (vidi: Sanders et al, Clin Chem Lab Med 2002; 40: 196–204). U odnosu na takav ishod pretraživane su Web stranice različitih Društava članica i Pridruženih članica IFCC. Pokazalo se da manje od jedne trećine obe grupe posvećuju pažnju edukaciji. Ovo vodi ka seriji pitanja kolegama koji nisu predstavljeni u EU a koji žele da posvete više pažnje procesu edukacije u svojoj zemlji, a uključeni su aktivno u kliničku hemiju i laboratorijsku medicinu. Krajnje ishodište ne daje uniforman obrazac, s obzirom da u svakoj zemlji postoji specifična regulativa u oblasti zdravstvene zaštite, shodno sopstvenom istorijskom razvoju, potrebama, socijalnoj viziji itd. Iz ovih činjenica moguće je izvući brojne zaključke:

- a. Neophodno je odgovarajuće univerzitetsko obrazovanje za postizanje zanimanja
- b. Potrebno je regulisati program obrazovanja (4 godine)
- c. Za ostvarivanje obrazovanja za zanimanje potreban je dobar Syllabus kao vodič
- d. Neohodno je uključivanje menadžmenta u obrazovanje s obzirom da je klinički hemičar odgovoran i za organizaciju posla
- e. Ispiti potpomažu kvalitet edukacije
- f. Zvanični registar, priznat zakonski, je neohodan, mada ne postoji uvek
- g. Re-registracija, zakonski regulisana, je veoma bitna, mada uvek ne postoji

Na kraju, posebna pažnja navedenim problemima je posvećena od strane EMD (Education and Management Division). Ovo Odeljenje IFCC-a pruža članicama IFCC-a i široj zdravstvenoj javnosti informacije o tome kakva edukacija treba da se sprovodi u oblasti kliničke hemije i laboratorijske medicine. Namera je da EMD utiče na poboljšanje profesije edukacijom u oblasti molekularne biologije, laboratorijske medicine zasnovane na dokazima, osiguranja kvaliteta, obrazovanja na daljinu i laboratorijskog menadžmenta. Izvode se i specifični projekti kao Master kursevi iz laboratorijskih nauka, kurs iz floucitometrije, i visiting programi predavanja uz pomoć nacionalnih društava a vezano za specifične teme. Više informacija o ovome može se naći na Web sajtu IFCC-a (www.ifcc.org). U budućnosti može se očekivati da će edukacija u našoj profesiji biti više orjentisana na kliničku primenu testova, moderne medije i e-učenje, kao i specifične kurseve u novim tehnologijama. EMD radi stalno na poboljšanju kvaliteta kliničke hemije i laboratorijske medicine. Iz ovog razloga informacije iz nacionalnih društava su dragocene kako bi se uočili različiti zahtevi kao potreba pojedinih članica IFCC-a.

Ključne reči: edukacija, obučavanje, klinička hemija, laboratorijska medicina, IFCC-EMD

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