PERSONAL VIEW

Education and training in internal medicine in Europe

H F P Hillen

Presented during the IIIrd Congress of the European Federation of Internal Medicine, Edinburgh, 11 May 2001

Sir William Osler was the Regius Professor of Medicine in Oxford at the end of World War I. In those days there was a great demand for postgraduate medical education. This was the motive for the foundation of the Fellowship of Postgraduate Medicine, under the presidency of William Osler. Osler himself had received his postgraduate education in Europe, from 1872 to 1874, during a two year sabbatical leave in teaching clinics in Germany. It was during this period that internal medicine was introduced as a specialty in the schools of medicine in Berlin, Göttingen, and Vienna.¹ Postgraduate education in these clinics was directed at the practice of clinical medicine and was based on the latest advances in physiology, bacteriology, and pathology. The switch from mere observation to understanding had been made.

William Osler was one of the first medical teachers who realised that this paradigm shift towards pathophysiology, from knowing to knowing how, had significant implications for medical education. He wrote about this on several occasions, and his main message was: do not try to teach the student too much, but give him good methods, and a proper point of view, and all other things will be added, as his experience grows.² Self directed, problem based learning "avant la lettre".

With this quotation by the most cited author on medical education, I thought that I could easily accept the invitation to present the Fellowship of Postgraduate Education lecture on the subject of postgraduate education in internal medicine in Europe. After all, internal medicine was invented in Europe, William Osler, respected in the Old and in the New world, had prescribed the teaching method already, and all I had just to do was describe the good methods and the proper point of view.

I completely agree with Osler's point of view on medical education that it is not the burden of factual knowledge that is important, because knowledge is fleeting. What is important is to learn the methods for obtaining and applying knowledge, and to acquire a viewpoint on how to become the best possible internist for your patients and your public: that is the core of medical education in internal medicine.

I will, therefore, try to develop a point of view for the European internist, a blueprint of internal medicine founded on the philosophy of internal medicine, the present legislation, the practice of internal medicine in Europe, and on images of Europe. I will also discuss the method of good educational practice on the

basis of the present training programmes and of concepts of learning.

A point of view on internal medicine in Europe

The main goal of postgraduate education in internal medicine is the making of good internists. For that purpose it is necessary to define what a good internist is, since a viewpoint on the principles and practice of an internist in the 21st century in Europe will obviously form the framework for present final requirements of postgraduate training.

The philosophy of internal medicine

As a consequence of the Cartesian philosophy, that man functions as a machine and that defects in this machinery cause illness, the science of internal medicine started in the middle of the 17th century with observation at the bedside with the description of diseases, known as nosography. Thomas Sydenham, who practised in London in 1655, gave clinical observation its place as a scientific method.³ In philosophical terms observational medicine is an inductive science, from observation of single patients or phenomena to general rules. Boerhaave, who taught at Leiden University at the beginning of the 18th century, was greatly influenced by Sydenham's work on clinical observation. In Boerhaave's textbook, *A Method of studying Physics*, sold in London in 1729 for the price of five shillings, an early mention of *medicina interna* can be found. At that time, Boerhaave's influence as a clinical teacher was widely spread over Europe. Among his pupils was John Rutherford, who introduced clinical teaching to Scotland and became president of the Royal College of Physicians in Edinburgh.⁴

The inductive method was further developed by the introduction of physical examination, percussion and auscultation, particularly in the Paris school of medicine during the period of Laënnec (1781-1826). Laënnec introduced the stethoscope to l'Hôpital Necker in 1819. Subsequently, clinical observations were compared with the findings of postmortem examination. In the 19th century, the pathological method dominated inductive observational medicine in the famous schools of Medicine in Paris (Laënnec), Vienna (van Rokitansky), and Berlin (Virchow).³

In the first half of the 19th century the scientific inductive method of internal medicine was extended in the direction of numerical reasoning, now called clinical epidemiology and

University Hospital
Maastricht, PO Box
5800, 6202 AZ
Maastricht, The
Netherlands

Correspondence to:
Professor Dr Hillen
hhi@sint.azm.nl

Submitted 14 May 2001
Accepted 15 May 2001

Table 1 The philosophy of internal medicine

Inductive	Deductive
Empirical	Analytical
Hippocrates	Aristotle
Descartes	Galen
Sydenham	Bernard
Sackett	Popper
Clinical epidemiology	Molecular biology

evidence based medicine. Pierre Alexandre Louis developed Médecine d'Observation in 1830 in the Pitié hospital in Paris. Louis introduced the statistical method to medicine, describing the epidemiology of tuberculosis and fever. He conducted clinical trials that showed that blood letting does not work. The inductive science of internal medicine became a probabilistic or stochastic science.⁵

The second half of the 19th century was the time of the dawn of experimental medicine. In 1865, Claude Bernard published *Introduction à la médecine expérimentale*. Bernard introduced pathophysiological reasoning to medicine. Experimental laboratory research was done to find general rules of pathophysiology that could be applied to individual patients. In the philosophy of science, this is the deductive method.⁵

The introduction of bacteriology and immunology by Pasteur and Koch, and the introduction of biochemistry to medicine by Justus van Liebig at the University of Giessen, and later Paul Ehrlich in Berlin, were along the same line of the deductive analytical method. At present, the great developments in molecular biology emphasise the influence of the deductive method in internal medicine.⁶

The history of the philosophy of medicine shows a balance between inductive and deductive science. From the inductive observation of Hippocrates, Sydenham to clinical epidemiology; from the logic of Aristotle to Bernard, to the hypothetico-deductive method of Popper and to molecular biology. Both scientific methods have to be learned during postgraduate education. Just which of these two should have more emphasis depends on the time and on medical developments. It may well be that present trainees of internal medicine, who will work as internists in 2030 and beyond, have to learn much more about deductive molecular biology, the human genome and proteome, than we now offer in our programmes (table 1).

But internal medicine is more than just induction and deduction. The real method of internal medicine is at the bedside, where the science and the art of internal medicine meet. Again, I quote William Osler: "Medicine is an art based on science". That is the point of view he proposed for education in internal medicine.

Besides the inductive and deductive science, there is the humanistic science of internal medicine. Care for patients depends on the psychosocial circumstances of the patient and certainly, at this moment, on health care systems. Care for patients can only be given with an attitude of professionalism, with high

Table 2 Discipline of internal medicine

Method of observation	Pattern recognition Nosography
Analytical method	Biomedicine Pathophysiology
Numerical method	Epidemiology Clinical decision making
Humanistic discipline	Professionalism

standards of ethical and human values.⁷ Professionalism is such a core value of medicine that it was an integral part of the ancient history of European medicine. The physician-god Asclepius was noted for his devotion to healing the slaves and the poor, regardless of the size of their offering.⁸ It is very important that the European Federation of Internal Medicine (EFIM) works in close cooperation with the American Board of Internal Medicine (ABIM) on a project of professionalism.⁹⁻¹⁰ The EFIM and ABIM will certainly recommend including the training of professionalism in all postgraduate medical programmes.

Inductive, deductive, and humanistic science contributed to the progress of internal medicine, especially in the second half of the 20th century. But there is an extra layer of complexity in the health and disease of every individual patient. No one reacts in exactly the same way to complaints or illness. Because of this individual complexity, the skills of bedside medicine are vital for good doctoring. In this aspect, medicine and certainly internal medicine differ from the practice of any of the other applied sciences.¹¹

Bedside medicine involves the skills of observation, and of communication with individual patients, attention to individual reactions to disease, and pastoral skills. These aspects are especially necessary in elderly patients with multiple morbidity and in patients with unexplained disorders. It is in bedside medicine that the complexity of the practice of medicine is expressed pre-eminently.

Inductive, deductive, humanistic science and bedside medicine are all involved in the philosophy of internal medicine (table 2). Philosophies, however, are meant to find the answers to basic questions such as: "what is a good internist?". Perhaps the most specific characteristic of a good internist is the competence of integration. Integration of empirical inductive, analytical deductive, and humanistic science at the bedside in a holistic approach to the care of patients with complex or multiple diseases, that is the heart of the matter of internal medicine. This integrative competence, even more than the clinical competencies, defines internal medicine and distinguishes internists from other medical professionals. And this competence of integration should, in my opinion form the foundation for postgraduate medical education (fig 1).

The European internist

A practical view on internal medicine in Europe comes from a series of articles in the

Figure 1 Integration: the holistic method of internal medicine.

European Journal of Internal Medicine and from a survey from the member societies of the EFIM, in March 2000. In most countries, the practice of internal medicine is hospital based and science based. The general denominator for internal medicine is that of specialised medicine for complex medical problems, multiple pathology, systemic disorders, and unselected medical emergencies. European internists are skilled in anamnesis, physical examination, interpretation of diagnostic tests, and in clinical reasoning. Internists offer continuity of care and are specialised in pharmacotherapy. Internal medicine is practised with a comprehensive holistic approach. The internist is committed to lifelong learning.^{12–14} This practical view on internal medicine in Europe fits very well into the above presented more philosophical point of view.

European Union legislation on internal medicine

Since the treaty of Rome in 1957, there has been a European legislation on internal medicine. This legislation is restricted to main lines and leaves many regulations to the member states. The free movement of internists and the mutual recognition of diplomas are the two basic laws concerning medical specialties in Europe. After the treaty of Maastricht in 1993, the doctors' directive 93/16 was issued, with additional legislation on the list of specialist diplomas for mutual recognition and on minimal requirements of training. For internal medicine, the doctors' directive prescribes a minimal duration of training of five years.

At the moment, an updating of the doctors' directive is in preparation. The Advisory Committee on Medical Training of the European Union of Medical Specialists (UEMS) recommended a duration of six years of training for internal medicine and allied medical sub-specialties, and the introduction of a common trunk of two years training in internal medicine for those specialties requiring experience in internal medicine. These principles have been agreed upon in the specialist sections of the UEMS and by the scientific societies of the different specialties in Europe. But the updating of the doctors' directive 93/16 still waits for official European Commission legal implementation.

The legal bottom lines for postgraduate medical education in Europe are a minimal duration of training of five years, six years in the near future, and the mutual recognition of internists' diplomas.¹⁵

Images of Europe

Within the European Union there is a tendency towards complete economic and juridical harmonisation. The question is whether there should be further harmonisation of the specialist training. It is obvious that Europe has a precious diversity of cultures, languages, and "cuisines". The economist Hofstede has published interesting results of research on cultural images of Europe.¹⁶

European countries are different in basic social characteristics, such as the acceptance of inequality or power distance, the acceptance of uncertainty or the level of anxiety in a society, the social roles of men and women, and moral values of rich versus good. Some countries are more feminine than others; many countries in Europe prefer the values of individualism above collectivism. European countries speaking a Romance language and the English generally have more masculine and more individualistic social characteristics than European countries with a Germanic language.

These characteristics not only produce a wide diversity but also have interesting relationships to health care. The Netherlands figures as the most feminine of the European Union countries, being sympathetic to the underdog and the individual, and the Dutch accept a certain level of uncertainty. According to Hofstede this social pattern is reflected in the Dutch attitude to drug addiction and the permissive attitude with regard to sickness leave from work. The British score high as individualists, and this may well be related to the problems they have with the National Health Service and with the ratification of the Maastricht treaty.

Images of Europe are also involved in the differences in the European countries with regard to the number of doctors, the number of internists, and the amount of the gross domestic product that is spent on health care. Images of Europe show a desirable diversity of societies and cultures. Internal medicine will recognise and cherish this diversity by its humanistic approach. Thus there is no need, it would not even be wise, to strive for complete harmonisation of postgraduate medical education in Europe.

Good educational practice

In the days of Hippocrates the directors of training were highly spoiled by their trainees, as can be read in the second article of the oath.¹⁷ This picture is completely different now. Directors of training nourish the trainees, they offer attractive educational programmes and introduce to them—in addition to good clinical and good laboratory practice—also good educational practice (table 3). Trainers in postgraduate medical education do all this because they know that the only way to maintain high

Table 3 Good educational practice

• Definition: Core curriculum	Goals and objectives
• Structure: Educational methods	Self directed learning
• Learning environment	Balance service/education
• Assessment: Residents Staff	Educational programme

quality internal medicine is by high quality postgraduate education.

This statement, however, is more an empirical observation than evidence based. In the ABIM report, published by Ramsey in the *Annals of Internal Medicine* in 1989, and in a recent paper by Taylor in the *New England Journal of Medicine*, the positive relationship between the quality of teaching and the outcome of health care is shown. In particular, the mortality of cardiovascular diseases and the mortality of hip surgery appeared to be lower in the larger teaching hospitals.^{18, 19} But I cannot find level I or II evidence for this claim.

Good educational practice should be based on the definition of the goals and objectives of the postgraduate training. Trainees and trainers have to be clear about the requirements that should be met at the end of a successful internist training. These final requirements can best be defined by the different national societies of internal medicine. The scientific societies are in the best position to define these final requirements in accordance with their views on internal medicine and with specific national health care demands.

Final requirements that were recently published by the Federated Council of Internal Medicine, the Royal College of Physicians in London, and the Danish and Netherlands Societies of Internal Medicine include several aspects covering the knowledge, skills, and attitudes of internal medicine.²⁰ The final requirements also include a list of diseases that are considered as “core” diseases, and on this list the level of competence per disease is stated.

With these final requirements in mind a core curriculum can be planned. This curriculum should be structured in such a way that final requirements of internal medicine can be met. The core curriculum for senior house officers in general internal medicine of the Royal College of Physicians in London is one example of such a structured curriculum.²¹

Educational practice in internal medicine in Europe

Presently, about 14 000 residents are in training programmes for internal medicine in the 18 European Union countries. The duration of the training is five years in 10 European countries and six years in eight of the 18 countries. In seven of the 18 countries the curriculum includes some form of examination.

The curriculum is often structured in three phases: inpatient internal medicine, rotations, and subspecialty electives. A structure leading from general principles of internal medicine to detailed subspecialty competencies.

Box 1: Psychology of learning

- More effective in context.
- More effective in self directed, small group learning.
- Structure explicit learning moments.
- Attitude and method of learning in the long term is more effective than knowledge.
- Formative assessment is effective learning.

Learning methods

In keeping with good educational practice, many of the undergraduate medical training programmes in Europe have introduced a system of problem based learning. There are arguments to also include the method of problem based learning also on the curriculum of internal medicine.²²

The psychology of learning has shown—at least for medical students—that self directed learning is more efficient than a teaching approach with passive knowledge transfer, such as the classical lecture. Cognitive psychology has also proved that learning in small groups is more efficient, and that, in the long run, learning how to obtain and to analyse knowledge is more effective than mere knowledge itself (box 1).^{23, 24}

My personal opinion is that problem based learning is particularly effective for the inductive part of science in internal medicine. Especially in the beginning of the training period, when clinical knowledge, interpretation, and analysis of data and pattern recognition have to be learned, active, small group, problem based learning will be effective.

It is obvious that a given method of learning is not suitable for every learning situation. Deductive science requires in-depth study, still using books. Bedside medicine may profit from teachers as role models. And the good aspects of the apprenticeship method also still have to be applied in a good curriculum.

Thus, a diversity of learning methods can be applied, when appropriate, to a particular stage in the training and to a particular learning goal. During the clinical training in general internal medicine, apprenticeship and learning by doing can be completed with problem based learning. In the subspecialty electives, in-depth study and learning by teaching may be more appropriate.

The application of any learning method is highly dependent on the learning environment. Apart from a learning infrastructure with personal computers and access to the internet and electronic medical literature systems, time for learning is the decisive factor.

In good educational practice, there should be a sound balance between service and education. In many European Union teaching hospitals, a training programme with 8–10 formal learning hours a week is customary. This is definitely less than in most larger teaching hospitals in the United States. In addition to

Table 4 Assessment: assessment is learning

What	Who	When
Log book	Residents	Rotations
Formative assessment	Residents	Courses
		Yearly
Role model, teaching	Staff	Yearly
Curriculum	Programme director	Site visits
	Teaching hospital	

formal learning hours, trainees should have sufficient time and opportunities to study in a system of self directed learning.

In June 2000 the European Commission passed a law on working hours for doctors in training. The average number of working hours a week was set at 48 after a period of transition. This law will put the balance between service and education under heavy pressure, unless our societies are able to solve the problems of manpower planning.

The last, but not least, aspect of good educational practice is assessment. From the science of learning we now know that assessment is of vital importance to any learning method. Formative assessment with feedback to trainees is especially useful in increasing the effectiveness of learning (table 4).

The literature on assessment shows high reliability for multiple choice question assessment, for short essays and for the method of objective, structured, clinical examinations consisting of a series of tasks and clinical encounters.²⁵ The ABIM has extensive experience in testing the validity of different assessment models. Therefore cooperation with members of the EFIM who are active in this field of assessment will be very fruitful for European training programmes. In good educational practice, not only are the trainees assessed but also the teaching staff and curriculum, for example by a system of site visits.

Coming back to William Osler, I have tried to explore the point of view on internal medicine as an integrative science and I have

advocated the method of good educational practice. Postgraduate medical education is a challenge for internal medicine in Europe because the more we succeed, the better the future of internal medicine in Europe.

- 1 Bliss M. *William Osler: a life in medicine*. Oxford: Oxford University Press, 1999.
- 2 Osler W. On the need of a radical reform in our methods of teaching senior students. *Med News* 1903;**82**:49–53.
- 3 Faber KH. *Nosography, the evolution of clinical medicine in modern times*. 2nd Ed. New York: AMS Press, 1978.
- 4 Lindeboom GA. *Dutch medical biography*. Amsterdam: Rodopi Amsterdam, 1984.
- 5 Vandenbroucke JP. Clinical investigation in the 20th century: the ascending of numerical reasoning. *Lancet* 1998;**352**:12–16.
- 6 Porter R. Medical science. In: Porter R, ed. *The Cambridge illustrated history of medicine*. Cambridge: Cambridge University Press, 1996: 154–202.
- 7 Neufeld VR. Physician as humanist: still an educational challenge. *Can Med Assoc J* 1998;**159**:787–8.
- 8 Bailey JE. Asklepios: ancient hero of medical caring. *Ann Intern Med* 1996;**124**:257–63.
- 9 American Board of Internal Medicine. *Project professionalism*. Philadelphia: American Board of Internal Medicine, 1995.
- 10 Stephenson A, Higgs R, Sugarman J. Teaching professional development in medical schools. *Lancet* 2001;**357**:867–70.
- 11 Weatherall D. *Science and the quiet art. Medical research and patient care*. Oxford: Oxford University Press, 1993.
- 12 Raptis SA, Chalevalakis G. Internal medicine in Greece. *Eur J Intern Med* 1999;**10**:225–9.
- 13 Kellett J. Acute hospital medicine in Ireland. *Eur J Intern Med* 1999;**10**:177–81.
- 14 Sereni D, Dupond JL. Internal medicine in France. *Eur J Intern Med* 2000;**11**:55–8.
- 15 Eysenbach G. *Medicine and medical education in Europe*. Stuttgart: Thieme Verlag, 1998.
- 16 Hofstede G. *Images of Europe*. Maastricht: University Press Maastricht, 1993.
- 17 McHugh PR. Hippocrates à la mode. *Nat Med* 1996;**2**:507–9.
- 18 Ramsey PG, Carline JD, Inui TS, et al. Predictive validity of certification by the American board of Internal Medicine. *Ann Intern Med* 1989;**110**:719–26.
- 19 Taylor DH, Whellan DJ, Sloan FA. Effects of admission to a teaching hospital on the cost and quality of care for medicare beneficiaries. *N Engl J Med* 1999;**346**:293–9.
- 20 American College of Physicians. *Graduate education of internal medicine. A resource guide to curriculum development*. Philadelphia: ACP, 1997.
- 21 Royal College of Physicians London. *A core curriculum for senior house officers in general (internal) medicine and medical specialties*. 2nd Ed. London: RCP, 1997.
- 22 Jones R, Higgs R, de Angelis C, et al. Changing face of medical curricula. *Lancet* 2001;**357**:699–703.
- 23 Davies PH. Approaches to evidence-based teaching. *Medical Teacher* 2000;**22**:14–21.
- 24 Schmidt HG. Foundations of problem-based learning. *Med Educ* 1993;**27**:422–432.
- 25 Wass V, Van der Vleuten C, Shatzer J, et al. Assessment of clinical competence. *Lancet* 2001;**357**:945–9.