Journal of Internal Medicine 2000; **248**: 95–101

Medical education in the new millennium

L. H. REES
From the Director of Education, Royal College of Physicians, London, UK

Abstract. Rees LH (Royal College of Physicians, London, UK). Medical education in the new millennium (Internal Medicine in the 21st Century). *J Intern Med* 2000; **248:** 95–101.

This article reviews current trends in undergraduate and postgraduate medical education and speculates on the future in the new millennium.

Keywords: change, health care systems, medical education.

Background

Medical education is forever in a state of evolution and change but has difficulty in adapting to the even more rapidly changing health care systems to which it must respond. As we are now in the 21st century, we will continue to debate what will be the roles of doctors and how we can continue to prepare them for their tasks within this framework of change. Organizations, authorities and, most importantly, our patients question the very nature of the aims of both undergraduate and postgraduate medical education. Such questions are not unique to the recent past, however, and over the years there has been much analysis of the perceived problems; many solutions have been proposed, but rarely have these been achieved. Indeed, in the 20th century, the issues were repeatedly analysed, with as many as 15 studies in the USA alone [1].

In 1988, the World Federation for Medical Education pronounced:

> The aim of medical education is to produce doctors who will promote the health of all people, and that aim is not being realized in many places, despite the enormous progress in the bio-medical sciences…. These defects have been identified for a long time, but efforts to introduce greater social awareness in medical schools have not been notably successful. Such facts have led to mounting concern in medical education about equity in health care, the humane delivery of health services and the overall cost to society.

The Association of American Medical Colleges [2] stated:

> Over the past 60 years, most medical schools have done little to correct the major shortcomings in the ways they educate their students, even though these differences have been documented repeatedly.

Tosteson [3] wrote:

> Despite the bold and interesting approaches taken by several institutions, the curriculum at most US Medical Schools remains quite similar in form to that advocated by Flexner.

The Flexnerian model [4] embraced a clearly defined separation of basic and clinical sciences, with the

Table 1 The aims of basic medical education. (Adapted from the GMC [6]; Towle [18])

- The primary aim of the undergraduate course is for the student to acquire an understanding of health and disease and of the prevention and management of the latter, in the context of the whole individual in his or her place in the family and in society
- The second main aim is to develop an attitude to learning that is based on curiosity and the exploration of knowledge rather than on its passive acquisition

Further aims

- Reduction of the excessive burden of information in the existing undergraduate course
- Introduction of a substantial component of problem-based learning
- A clinical component in which students have direct contact with patients and with the analysis of their problems throughout the 5 years of the course
- An understanding of research method

first 2 years devoted to the basic sciences followed by a lecture-based and apprentice-type 3 year clinical course. Indeed, a survey undertaken in 1990 by the American Medical Association [5] revealed that 92% of the 31 countries that replied confirmed that the Flexnerian approach was in place, whilst, where change was occurring, the philosophy of integration was explicit. In 1993, the General Medical Council of the UK, having reviewed UK medical education, published *Tomorrow's Doctors* [6] in which it defined the mission of undergraduate medical education to be to produce doctors who have attitudes to medicine and learning that will fit them for their professional career and commit them to a lifetime of learning and development. Within curricula, they identified factual overload as a major problem and deemed that there was little evidence of self-directed learning, evaluation of evidence or critical reflection and thought (Table 1).

Similar conclusions were reached by the national enquiry of the King's Fund [7] (Table 2) and from the 15 reviews of medical education since 1910 in the USA (Table 3)!

However, changing the process of medical education alone is not enough. It is essential to define the required competencies of doctors within the whole framework of the health care system in which they will work (Table 4). In the USA in 1991, the Pew Health Professions Commission, comprising health professionals, academics, policymakers and the business communities, analysed over 90 trends that they felt would influence the provision of health care over the next two decades, including changes in cultural values, epidemiology, demography and economics, and identified what they perceived as the main characteristics of an effective health care system (Table 5).

Table 2 Aims of the curriculum (Towle [7])

- Reduction in factual information
- Active learning
- Principles of medicine (core knowledge, skills and attitudes)
- Development of general competence (e.g. critical thinking, problem-solving, communication, management)
- Integration (vertical and horizontally)
- Early clinical contact
- Balance between hospital/community; curative/preventive
- Wider aspects of health care (e.g. medicolegal/ethical issues, health economics, political aspects, medical audit)
- Interprofessional collaboration
- Methods of learning/teaching to support aims of curriculum
- Methods of assessment to support aims

In the UK, the momentous NHS reforms of 1991, with the generation of an internal market, implicit rationing as well as the endless fiscal pressures, a greater need for more community-based care and a greater commitment of resources to primary care brought into relief the whole question of the role of the doctor, particularly in relation to the changing nature of the work undertaken by other health professionals. In particular, a shortage of consultants, other doctors, nurses and hospital beds [8] has meant that the whole skill mix of the profession needs redefining.

Today, in the UK, the government has just announced a cash injection of £19 billion into the NHS but with the caveat that practices of and traditional demarcations between health care professionals must change and 'modernise' [9].

Skills required for the new millennium

Whilst all these uncertainties prevail, nonetheless some basic tenets still apply and it is against these that medical schools will be, and are, evolving. Wherever medical education is occurring, an amazing worldwide consensus has arisen concerning the competencies of future doctors [10] (Table 4). In particular, within the UK there has been consider-

Table 3 Summary of recommendations on curricular content and process from major US studies. (From Enarson and Burg [1]; Towle [18])

- Medical students should receive a broad general education in both the clinical and basic sciences
- The objectives of an undergraduate medical education should be clearly defined and curricula designed to meet these objectives
- Schools of medicine must ensure that their educational programmes integrate the sciences of medical practice throughout the entire course of the study
- The acquisition of lifelong learning skills, values and attitudes should receive at least as much emphasis as the acquisition of knowledge, i.e. memorization of factual material
- In addition to an understanding of the biological disciplines, physicians must have an understanding of other disciplines critical to the provision of high-quality health care. Therefore, medical education must include the behavioural, social, probabilistic and information sciences and ethics
- The general professional education of physicians should include an emphasis on health and disease prevention
- Schools of medicine must expand their educational sites beyond tertiary care hospitals to include, for example, ambulatory care settings, community hospitals, nursing homes and hospices
- Health professions education should be adapted to meet the challenges produced by ongoing changes in the organization, financing, and provision of health care

able questioning of the attitudes of doctors towards their patients and their inability to communicate effectively. Until recently, most entrants into UK medical schools were school-leavers, usually 18 or 19 years old, whereas in the USA all are already mature graduates, arguably equipped with life experiences which fit them better to become physicians with desirable competencies, including appropriate attitudes and communication skills. However, this scenario is changing within the UK, although it has to be said that this is happening in response to other pressures, *viz.* the shortage of doctors and hence the establishment of new medical schools, and the introduction of university fees. Some new medical schools will have a graduate-only intake, so it should be possible to undertake some type of evidence-based comparative evaluation of the two models.

Table 4 Competencies for the future practitioner (Pew Health Professions Commission – O'Neil [34])

- Care for the community's health
- Expand access to effective care
- Provide contemporary clinical care
- Emphasize primary care
- Participate in coordinated care
- Ensure cost-effective and appropriate care
- Practice prevention
- Involve patients and families in the decision-making process
- Promote healthy lifestyles
- Assess and use technology appropriately
- Improve the health care system
- Manage information
- Understand the role of the physical environment
- Provide counselling on ethical issues
- Accommodate expanded accountability
- Participate in a racially and culturally diverse society
- Continue to learn

However, there is increasing recognition that until all communications between physician and patient are recognized as potentially therapeutic acts, the profession will continue to 'fail' those it serves. Indeed, some say that it beggars belief that an understanding of the psychological sequelae and care of 'medical' patients has only relatively recently been deemed desirable for preregistration house officers [11, 12]. Regrettably, this reflects the professional division between psychiatry and medicine, promoted by their separation in undergraduate curricula and into separate Royal Colleges at the postgraduate level. The publication of their joint report and subsequent debate were much welcomed. Medical schools in the UK are making progress and, in the main, have at least acknowledged these issues as important. The postgraduate deans, those who commission and purchase education and clinical care and those who promote and monitor standards in continuing medical education and professional development, in particular the Royal Colleges, should do likewise and place communication between doctors and their patients at the heart of medicine.

Education requirements

One of the main features of the GMC's *Tomorrow's Doctors* was a 'core and options' curriculum based on the central theme that basic competence must be defined and that the remaining skills and knowledge should be flexible and within the remit of individual schools. This approach has, however, not been successful in the past [13], but that was within a different historical and political framework. Most UK medical schools have defined the 'core', and other

Table 5 Characteristics of an effective health care system (Pew Health Professions Commission – O'Neil [34])

- A health care system that is more orientated to health, stressing disease prevention and health promotion, as well as individual responsibility for health-related behaviours
- Population-based, as more attention is paid to risk factors in the physical and social environments, many of which must be addressed at a community level
- The system will be even more driven by information, using electronic synthesis of complete patient histories and the relevant literature to support providers' diagnostic decision and treatment recommendations
- Readily available information will facilitate growth of a stronger focus on consumers, as patients become fully informed participants in decisions concerning their own health care
- Decisions will be based largely on expanded knowledge of treatment outcomes in similar circumstances and on the use of integrated and coordinated teams of providers
- This will result in more effective care, more efficiently provided
- A serious concern about balancing technology will intensify as technology's benefits in improving care are weighed against its effects on human values, the interpersonal aspects of provision of care, and an ongoing concern about the costs of care to individuals and society
- Every health care provider will experience an increasing accountability to more interest groups for a wider range of outcomes

professional bodies have also risen to the challenge, at least for the preregistration house officer year [14].

In my own medical school, over 15 years ago, an evaluation of the undergraduate medical experience of our students and preregistration house officers showed huge variability in clinically based teaching, with emphasis on factual regurgitation, with few objectives and with the learning of communication skills virtually non-existent and the concept of patient-centred care sorely lacking [15, 16].

Partly in response to this and in moving from the lecture theatre/apprentice paradigm, skills centres have increasingly become '*de rigeur*' in the UK, not only for undergraduate learning but for postgraduate continuing medical and professional development. The tragic and well-publicised 'keyhole' surgery debate in the UK resulted in the Royal College of Surgeons of England establishing its own minimal access surgical skills centre. A skills centre is a facility in which students and doctors and other health care professionals can learn clinical, communication and information technology skills to a specific level of competence prior to and in tandem with direct patient contact. Within this environment, patients are not used as 'teaching aids' and students are not 'diverted' by the multidimensional complexity of the sick person [17]. Within this non-threatening environment, mannequins, patient volunteers, simulated patients and actors are employed and a structured approach to skills learning and assessment, with teacher supervision, ensures separate mastering of each skill. Furthermore, independent access enables students to refine skills and postgraduates to re-learn and re-define their skills.

The use of video recording/playback facilities and two-way mirrors facilitates peer feedback and evaluation. Most importantly, shared learning can occur amongst different health professionals, which encourages understanding of the different roles and skills of different team members [17].

The Clinical Skills Laboratory within St Bartholomew's and the Royal London School of Medicine, based on the Maastricht model (University of Limberg, Netherlands), was established as the first in the UK, jointly with the College of Nursing and Midwifery. A clinical skills matrix was compiled and a catalogue of 59 separate communication skills and 540 clinical skills was established with a clear consensus that communication was an essential and integral part of every skill [19]. All clinical and communication skills are assessed by an objective structured clinical examination (OSCE) and experience with one skill alone, intravenous drug administration assessed by OSCE, showed a 14% improvement after 2 years' skill centre training [19]. In recognition of these issues, the Royal Colleges of Physicians (UK) will also be introducing a modified OSCE called PACES (practical assessment of clinical examination skills) in its clinical assessment for the MRCP UK examination. There are now many such facilities within the UK medical education domain.

Multiprofessional learning and working

The intense interest in teams, multiprofessional learning and working, and the interest in the UK of the 'generic health worker' are driven by complex forces. As described earlier, it is not only driven by

structural NHS changes; the 'new deal' on doctors working hours has also led local NHS managers, the NHS Executive (NHSE) and Government to question historical professional boundaries. Nurses in the UK are already working across traditional doctors' boundaries. We now have nurse-led clinics and wards, NHS Direct (a nurse-led health telephone line) and this year the NHSE will pilot nurse-prescribing. The 15 April 2000 issue of the *British Medical Journal*, published jointly with *Nursing Times,* focuses on these complex and timely debates.

Another recent issue of the *British Medical Journal* (18 March 2000) is mainly devoted to 'reducing error, improving safety' and the place of education within this discussion. A paper discussing how to reduce errors by emergency physicians in interpreting radiographs [20] concluded that rather than comparing the performance of the two professional groups (emergency physicians and radiologists), their longitudinal study showed the impact of cooperation in reducing errors and thus the potential adverse events!

The skill mix will evolve and the empowerment and autonomy of patients and their access to information via the Internet will continue apace. Unless undergraduate schools face up to this, doctors will be ill-equipped for the job in hand. What is really needed are joint professional approaches and modularity (as exists within the humanities in higher education). It is not uncommon to find students doing combined honours in French, German, Economics and History, but what about nursing with radiography? Since, in the UK, health sciences have been brought together within many universities (e.g. Sheffield, Leeds, Southampton, etc.) interprofessional education could more easily become a practical reality.

CME and CPD and performance assessment

Whilst the debate concerning undergraduate medical education has run and run, the debate concerning continuing medical education (CME) and continuing professional development (CPD) outside the USA is in its relative infancy.

It is generally accepted that the boundaries between CME and CPD are becoming less clear and that CPD embraces CME and includes not only the refreshment and updating of factual knowledge but also the continuing development of communication and managerial skills, team-working, audit, personal and social skills, as well as participation in clinical governance at a multidisciplinary level.

A recent international study covering the UK, 18 other European countries, Canada, USA and Australia and New Zealand [21] has concluded that, although international systems vary in detail, there are many common features of content and process that allow internationally mutual recognition of activities in professional development. Whilst most systems are based on an hours-related credit system, the shortcomings of this rather narrow approach are self-evident [22]. Furthermore, it is clear, that in countries where recertification and revalidation are in place, the CPD components are an essential part of the process. In the UK, communication skills in general practice can be evaluated by the processes of both peer review and observation as well as video recordings [23, 24]. Most CME and CPD internationally are occurring within the framework of professional self-regulation. Some countries apply financial or other sanctions on those who do not reach the requirements of the CME/CPD programmes, and of course in many countries, hospitals, insurance and health maintenance organizations will not use the services of those failing to meet required standards.

An important factor in the UK was the publication by GMC of *The Duties of a Doctor* [25]. This is a comprehensive guide to good medical practice and was an improvement and development of *Tomorrow's Doctors* [6]. Furthermore, new legislation in 1997 allowed the GMC to scrutinize the performance of an individual practitioner and make recommendations on remedial support or removal from the medical register.

These GMC performance procedures usually involve observation by trained assessors of doctors in action with real or simulated patients, of their technical and procedural skills and of record-keeping. The procedures involve extensive discussion about clinical decision-making as well as attitudes and the patient's perspective. Any such assessment will obviously investigate any complaints that have invoked the procedures. Since the institution of these procedures, the high-profile case in the UK of a single-handed general practitioner who was found guilty this year of murdering many of his patients, and the Bristol Royal Infirmary Enquiry into deaths after paediatric cardiac surgery

have once again put the profession under the spotlight and the self-regulation issue remains high on the agenda [26]. What is clear is that by the time the GMC performance procedures are in place, the damage may well have been done by individuals and the paramount safety of the patient jeopardized. The debate in the UK for re-accreditation (recertification) rumbles on but has at last been clarified and it has been agreed that this will occur, but the nature of the process has yet to be defined.

The influence of information technology

In all of this debate, it is clear that both undergraduate and postgraduate medical education programmes have to face up to the changing nature of communication in the 21st century.

Medical education can clearly now extend virtually outside the bricks and mortar environment of individual universities with the use of the World Wide Web and the Internet. This challenge has recently been discussed in depth [27]. These authors identified a whole range of routine student activities which might be greatly aided by Internet use, particularly in access to problem-based learning, since the Internet is cheap and multiple users can access the same resources simultaneously. It is also easy for medical schools to establish pages which act as gateways to both local and global resources to support the curriculum. Several such sites are already in operation, including Ben Gurion University of the Negev, Stanford University Medworld and the University of California, Irvine, to name but three.

One educational package under development by the Royal College of Physicians, London, is Medical Masterclass, designed to support postgraduates preparing for the MRCP UK examination, which utilizes Internet access so that relevant sites can be visited. These include virtual libraries, key national and international agencies, clinical protocols and guidelines, the Centre of Evidence Based Medicine (Oxford), the Cochrane Centre and a whole variety of patient education resources, to name but a few. Of course, the quality control issues regarding Internet information are huge and those who access will need support and critical appraisal skills to make informed judgements [28]. It is therefore possible to envisage that both an undergraduate and postgraduate medical education experience, encompassing self-direction, rapid updating, IT literacies, clinical problem-solving abilities and, of course, the bedrock of knowledge, could be achieved by centrally delivered coordinated academic programmes distributed via the Internet with a constant, closely supervised clinical experience [29].

Table 6 The physician as educator

- How to conduct an appraisal
- How to assess a trainee
- On-the-job learning
- Designing educational programmes for trainees
- Teaching methods: large and small groups
- Trainees in difficulty
- Designing and delivering an effective educational event
- Evaluating programmes and courses
- Teaching resources
- How to be an effective educational supervisor

Physicians as educators

Finally, in the UK, it is at last recognized that those who have responsibility for teaching medicine at any level should be trained so to do [30–32]. In recognition of this imperative, the Royal College of Physicians has launched a major new initiative to support and improve the skills of physicians who have a teaching role. This 'physicians as educators' programme covers a whole range of topics (Table 6) and will bring us up to speed with other professions, such as nursing, where all nurse educators have the appropriate qualifications.

We must also remind ourselves of the admonition of the Hippocratic Oath [33]: 'First do no harm'. Within the context of medical education, this is of course central. However, we all want to do better than this and provide an effective and humane quality health care provision of the highest standard for all patients whom we serve.

Acknowledgements

I would like to thank Mrs Winnie Wade, Head of Education at the Royal College of Physicians, for her helpful comments.

References

1 Enarson C, Burg FD. An overview of reform initiatives in medical education. 1906 through 1992. *J Am Med Assoc* 1992; **268**: 1141–43.

2 Association of American Medical Colleges. *Educating Medical Students. Assessing Change in Medical Education: the Road to Implementation.* (ACME-TRI report). 1992.
3 Tosteson DC. New pathways in general medical education. *New England J Med* 1990; **322**: 234–38.
4 Flexner A. *Medical Education in the United States and Canada.* New York, NY: Carnegie Foundation for the Advancement of Teaching, 1910.
5 Carlson CA. International medical education. Common elements in divergent systems. *J Am Med Assocation* 1991; **266**: 921–23.
6 GMC. *Tomorrow's Doctors.* London: General Medical Council, 1993.
7 Towle A. *Critical Thinking. The Future of Undergraduate Medical Education.* London: King's Fund Centre, 1991.
8 Department of Health. *Shaping the Future NHS. Long Term Planning for Hospitals and Related Services.* London: Department of Health, 2000.
9 Appleby J, Boyle S. Blairs billions: where will he find the money for the NHS? *Br Med J* 2000; **320**: 865–67.
10 Boelen C. Medical education reform: the need for global action. *Acad Med* 1992; **67**: 745–49.
11 Royal College of Physicians and Psychiatrists. *Joint Working Report: the Psychological Care of Medical Patients: Recognition of Need and Service Provisions.* London: Royal College of Physicians and Psychiatrists, 1995.
12 Sharpe M, Guthrie E, Peveler R, Feldman E. The psychological care of medical patients: a challenge for undergraduate medical education, *J R Coll Physicians Lond* 1996; **30**: 202–204.
13 Robbins F. Curriculum innovations at Case Western reserve University of Medicine. *Ohio State Med J* 1977; **73**: 41–42.
14 Royal College of Physicians. *A Core Curriculum for Senior House Officers in General (Internal) Medicine and the Medical Specialties.* London: RCP, 1996.
15 Jolly BC, Rees LH. *Room for Improvement: an Evaluation of the Undergraduate Curriculum at St Bartholomew's Hospital Medical College.* Mimeo. London: SBHMC, 1984.
16 Jolly BC, Macdonald MM. Education for practice: the role of practical experience in undergraduate and general clinical training. *Med Educ* 1989; **23**: 189–95.
17 Studdy SJ, Nicol MJ, Fox-Hiley A. Teaching and learning clinical skills, Part 2. Development of a teaching model and schedule of skills development. *Nurse Educ Today* 1994; **14**: 186–93.
18 Towle A. Aims of the curriculum. In: Jolly B, Rees LH, eds. *Medical Education in the Millennium.* Oxford: Oxford University Press, 1998.
19 Dacre JE, Nicol M. *Clinical Skills: the Learning Matrix for Students of Medicine and Nursing.* Oxford: Ratcliffe Medical Press, 1966.
20 Espinosa JA, Nolan TW. Reducing errors made by emergency physicians in interpreting radiographs; longitudinal study. *Br Med J* 2000; **320**: 737–40.
21 Peck C, McCall M, McLaren B, Rotem T. Continuing medical education and continuing professional development: international comparison. *Br Med J* 2000; **320**: 432–35.
22 du Boulay C. From CME to CPD: getting better at getting better. *Br Med J* 2000; **320**: 393–94.
23 General Medical Council. *The Performance Procedures: Position Paper No. 3.* London: GMC,1996.
24 Newble DI, Jolly B, Wakeford RE. *Certification and Recertification in Medicine: Issues in Assessment of Clinical Competence.* Cambridge: Cambridge University Press, 1994.
25 General Medical Council. *The Duties of a Doctor.* London: GMC, 1995.
26 Editorial. How best to learn. *Br Med J* 2000; **320**: 393–394.
27 Murphy J, Ingram D, Howard W. The Internet wardround. In: Jolly B, Rees LH, eds. *Medical Education in the Millennium.* Oxford: Oxford University Press, 1998.
28 Glowniak JV. Medical resources on the Internet. *Ann Intern Med* 1995; **123**: 123–31.
29 Rees LH, Jolly B. Medical education into the next century. In: Jolly B, Rees LH, eds. *Medical Education in the Millennium.* Oxford: Oxford University Press, 1998.
30 Irby DM. Models of faculty development for problem-based learning. *Adv Health Care Sci Educ* 1996; **1**: 69–81.
31 Standing Committee on Postgraduate Medical Education (SCOPME) (Oxley J, ed.). *Teaching Hospital Doctors and Dentists to Teach.* London: SCOPME, 1994.
32 Department of Health. *In the Patient's Interest, Multiprofessional Working Across Organisation Boundaries.* London: Department of Health, 1996.
33 Edelstein L. *The Hippocratic Oath. Supplements to the Bulletin of the History of Medicine.* Baltimore, MD: Johns Hopkins University Press, 1943.
34 O'neil EH. Education as part of the health care solution. Strategies from the Pew Health Profession Commission. *J Am Med Assoc* 1992; **268**: 1146–48.

Received 29 March 2000; accepted 4 April 2000.

Correspondence: Dr Lesley H. Rees, Director of Education, Royal College of Physicians, 11 St Andrews Place, Regents Park, London NW1 4LE (fax: + 44 0207796 4676; e-mail: l.h.rees@mds.qmw.ac.uk).

