immunisation before school entry or were passive supporters of such a policy. Other countries which have adopted compulsory measles immunisation have virtually eradicated the disease. This has been most notable in Czechoslovakia and the German Democratic Republic,^{17,18} and we have already referred to the practice in the USA, where immunisation is to all intents and purposes compulsory. Moreover, in Canada the medical profession has recently urged its government to adopt a similar approach.¹⁹ We agree with Campbell that it is now time for our profession to follow the example of our colleagues in these countries and press for legislation to protect the rights of children to be free from this potentially dangerous disease.²⁰ We formed the opinion that most parents would welcome a clear cut policy on this matter.

Although we have been able to evaluate our health education programme for only a relatively short period, the early results are extremely encouraging in that we appear to have achieved a 13% increase in the uptake during 1984. In the absence of a policy of compulsory immunisation we think that the importance of adopting such a personal and rigorous approach has much to recommend it. Other health boards in Scotland have adopted different strategies for tackling this pressing problem and this has contributed to the general rise in measles immunisation rates throughout Scotland of 8% on average during the past year.

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Green College Lectures

Educating the doctor: basic medical education

JOHN WALTON

Introduction

Basic medical education begins when a student enters the medical undergraduate course. In many countries it ends on graduation but in the United Kingdom the term embraces that period, usually called the preregistration year, which some prefer to call "general clinical training," between graduation and provisional registration on the one hand and full registration on the other (Crisp, personal communication). The content of training and experience afforded by that year are now under close scrutiny in pursuance of the responsibilities of the education committee of the General Medical Council (GMC) under the 1983 Medical Act for coordinating all stages of medical education.

During a symposium organised in December 1984 by the Association for the Study of Medical Education it emerged that many medical teachers question the validity and purpose of research into medical education. The *Lancet* suggested that, whatever the medical school of origin and its curriculum, much the same sort of young doctor emerged at the start of the preregistration year.¹ Similarly many teachers of medical students, unaware of the

techniques now available for defining precisely educational objectives and for assessing whether or not these have been achieved, nevertheless make critical comments on current medical education based solely on their personal experience as teachers and on the perceived response of those they have taught, while being unwilling to subject the educational process they have provided to independent peer review and critical analysis. I shall return to this topic later.

Historical background

The present era of basic medical education in the United Kingdom and in the United States of America began with the Flexner Reports of 1910 and 1912.

Flexner's analysis, reported in his bulletin no 4 of 1910,² justly criticised the inadequate staffing and laboratory and clinical facilities provided by many private medical schools in the USA, some of which were run as commercial enterprises by local practitioners. He contrasted these with the newly established hospital based schools, such as Johns Hopkins, where there were full time heads of clinical academic departments with responsibilities equally divided among teaching, research, and service to patients. His European survey of 1912 was equally critical of the inadequacy of clinical teaching and of research in Germany, while in Britain he commented unfavourably on the almost total divorce between teaching in the basic sciences and that in clinical disciplines.³ In his view the system of honorary hospital appointments, with teachers being financially dependent on extramural practice, diminished the quality of clinical training and research. Nevertheless, not until after publication of the Goodenough Report in 1944 and the subsequent introduction of the National Health Service in 1948 did

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the establishment of wholtime chairs and of academic departments in clinical disciplines gather pace.⁴

The process was further facilitated and redefined in the Todd Report of 1968.⁵ These were forerunners of the existing knock for knock agreement between the University Grants Committee and the departments of health, through which it has been informally, though never contractually, agreed that clinical services given by academic staff employed by the universities and funded by the University Grants Committee should be compensated for by teaching services provided by NHS senior and junior hospital staff. The knock for knock agreement is a fundamental principle on which the acknowledged excellence of undergraduate clinical training in the UK medical schools depends.

Financial stringencies in both the universities and the NHS are rocks on which the principle has been in danger of foundering, just as the dual support system agreed between the University Grants Committee and the Medical Research Council in relation to the support of medical research has crumbled similarly. Storm cones have been hoisted for several years past; it is a striking testimony to the quality and dedication of both staff and students that inspections of qualifying examinations in several schools carried out by teams of inspectors on behalf of the education committee of the General Medical Council have shown such a uniformly high level of achievement and clinical competence in our medical graduates.

Purpose and objectives of medical education

Whereas earlier medical acts required that a doctor graduating in medicine in the United Kingdom should be proficient in the practice of medicine, surgery, and midwifery, it is recognised that the demands of medicine are now so manifold and the corpus of medical knowledge is so vast that no programme of basic education could hope to produce a safe doctor, capable of totally independent practice, at the time of graduation.

"The principal objective of basic medical education is not to train specialists in any field of medicine or medical science but to provide doctors by the time of full registration with the knowledge, skills and attitudes which will provide a firm basis for future vocational training."⁶

This must be the answer to many of the special interest groups, of whom over 40 wrote to the General Medical Council within the past three to four years seeking inclusion or expansion of instruction devoted to their particular subject in the undergraduate curriculum. The medical needs of the populations of many developing countries have often and reasonably influenced the nature of the training which some of their new medical schools provide, sometimes with the unfortunate consequence of making it impossible because of deficiencies in their basic training for their doctors to receive limited registration for postgraduate training in the United Kingdom. The worthy Alma-Ata (1978) pledge of the World Health Organisation,⁷ which supported the concept of achieving health for all by the year 2000, and the health care needs of individual populations should not, however, in the UK, influence programmes of undergraduate training, but can properly be a factor to be considered in postgraduate and vocational education.

Hence the principal objective of basic medical education is to provide a pluripotential medical graduate possessing a core of knowledge, skills, and attitudes and an understanding of principles, on which the fruits of postgraduate vocational training for a wide variety of specialties and types of medical practice in the developed and developing world can subsequently be superimposed.

Regulation of medical education in the United Kingdom

Under the Medical Act of 1978, consolidated in 1983, the responsibility of the education committee of the General Medical Council includes the requirement that the committee shall: (a) determine the extent of the knowledge and skill which is to be required for the granting of primary United Kingdom qualifications and secure that the instruction given in universities in the United Kingdom to persons studying for such qualifications is sufficient to equip them with knowledge and skill of that extent; (b) determine the standard of proficiency which is to be required from candidates at qualifying examinations and secure the maintenance of that standard.

In pursuance of these responsibilities, recommendations on basic medical education are regularly published, the last in 1980.⁷ The following sentence stands out: "The Council has urged in previous recommendations that means must be found of reducing congestion and overcrowding in the medical curriculum by instructing less and educating more."

In his Harveian Oration to the Royal College of Physicians in October 1984 Professor A C Dornhorst commended this extract but went on to criticise subsequent recommendations which in his view made it inevitable that spoon feeding, overcrowding, and teaching rather than learning would be the consequence.⁸ Every medical educator recognises that such criticism has some validity, but those who criticise in this way fall into the same trap as do the many special interest groups who continually urge the inclusion of much new material in the undergraduate course. By excluding unnecessary factual detail and by concentrating on principle rather than comprehensiveness, overcrowding in the curriculum can be reduced and has indeed been reduced by many medical schools with advantage to the learning process.

I would commend in particular to the reader the broad behavioural objectives of basic medical education and especially those relating to knowledge, skills, and attitudes which are specified in section A of the 1980 document but which do not inevitably demand an overcrowded curriculum for their achievement.⁶

Variations on the theme

The education committee has always recognised that many different curricular structures and methods are capable of achieving a comparable end, and hence the recommendations also state:

"The process of basic medical education necessarily involves the study of many different subjects, but the practice of medicine involves more than a mastery of those subjects. It requires the development of certain attitudes and skills and the ability to synthesize and apply them. This must be achieved by each individual student for himself or herself, but the arrangement of the curriculum and the methods of teaching can assist or hinder its achievement.

The necessary understanding of medicine as an evolving discipline must be attained through the study of the physical, biological, behavioural, and social sciences and by the study of man himself in health and disease. It is the responsibility of the universities and of their medical schools to determine the nature, form and content of the courses which they provide in order to see that their students achieve this objective."

Latitude is thus allowed in planning and delivery of the curriculum. While it is suggested that instruction should be offered through a combination of didactic lectures, small group teaching, seminar discussions, and clinical bedside teaching, as well as through self instruction with a variety of teaching aids, freedom to experiment and to modify in the light of feedback from both staff and students is encouraged. Special emphasis is placed on training in general practice and in the community as well as in hospital. Wherever possible, integration between preclinical basic science education and clinical training is also recommended, with early introduction of students to patients. One curriculum which, in my view, has achieved these aims without detriment to the quality of teaching in science is that of the University of Newcastle upon Tyne.⁹

I must accept that sometimes virtually total separation between preclinical and clinical education may be undertaken without detriment, and indeed with advantage, especially when the pre-clinical stage entails an opportunity for study in depth of a scientific topic, an opportunity often afforded to undergraduates in universities other than Oxford, Cambridge, and St Andrews only by intercalating an extra year of scientific study leading to an honours degree before beginning clinical education proper.

Having, however, expressed my admiration for the example and quality of Oxbridge education, I must nevertheless express my firm opinion that the introduction of a much greater content of social and behavioural science teaching and of clinical exposure on a limited basis to patients might readily be accommodated without impairing the quality of scientific training offered to undergraduates. This need not lessen understanding of the scientific and experimental method, which is increasingly important in training all medical

students, whatever their ultimate career objective. To those who suggest that the early introduction of such topics would dilute the quality of training in physical and biological science, I can only say that this has not been the experience of other schools. And, though some regard "relevance" of teaching as a socially trendy concept, antipathetic to the principles of science, I can only affirm the view expressed by innumerable students whom I have taught that to see something of the social and physical effects of disease on man during the period that they are studying bodily structure and function, not only enlivens learning but fuels enthusiasm. There is good evidence that early exposure to behavioural science greatly improves the ability of students to communicate with, and relate to, their patients when they finally embark on clinical training proper. If acquired early, these skills are not necessarily eroded in early postgraduate training, as they tend to be if they are introduced peripherally or obliquely during clinical training itself.

ment of clinical performance. No one method is demonstrably superior. All that the education committee is required to decide is that the qualifying examination is sufficient. Were it not so, the committee would have the power to recommend to the Privy Council that the qualifying examinations of a medical school would no longer be registrable under the Medical Act.

Once the qualifying examination has been passed and a programme of clinical training, carried out under supervision in the preregistration year, is completed, the graduate is transformed into a legally qualified, fully registered, medical practitioner and guidelines are then offered which should direct his subsequent practice and career development: "On completing the period of basic medical education, an individual becomes a legally qualified medical practitioner. He must, however, learn to work as part of a team including other doctors and members of other health professions, and to function effectively in the society in which he finds himself.

Numbers of doctors and medical students in the various countries of the EEC in 1975 (and of practising doctors in relation to population in 1980)

	No of inhabitants in the EEC countries 1975	No of practising doctors in the EEC countries in 1975 and 1980				No of medical students in the EEC countries 1974-5	
		Number		Ratio inhabitants:doctors		Number	Ratio inhabitants:students
		1975	1980	1975	1980		
Belgium	9 801 000	18 506	22 759	529	433	13 693	715
Denmark	5 060 000	9033	11 143	562	460	7675	657
France	52 743 000	80 954	108 054	651	498	102 615	514
Germany	61 832 000	118 726	139 431	521	442	40 738	1518
Ireland	3 127 000	3758	4440	823	773	2424	1302
Italy	55 827 000	126 326	177 834	442	318	179 000	312
Luxembourg	358 000	383	538	942	679	387	925
Netherlands	13 660 000	21 892	26 987	624	526	12 638	1084
United Kingdom	56 043 000	82 550	94 304	679	598	18 737	2997
Total	258 451 000	462 128	585 490			377 827	

The figures for practising doctors in relation to population in 1980 have been added to the table and were derived from a document prepared by the Statistical Office of the European Communities at the request of the Committee of Senior Officials on Public Health, in July 1984. No up to date figures for medical students were then available.

But the behavioural sciences should certainly be taught by social scientists who are familiar with, and who feel at home in, the medical dimension. Every occupation, not least medicine, has its jargon, but little is more detrimental to the medical student's learning than being exposed to psychological and sociological theory in depth without thought being given to its practical application. Just as a clinical demonstration of physical signs with radiological illustration may enliven the understanding and recollection of human anatomical detail, or complexities of human purine metabolism may be made meaningful by seeing a patient with gout, principles of psychology and sociology are more readily grasped if the significance of psychological and social factors in the pathogenesis or modification of disease is clearly stated.

Have the objectives been achieved?

One must accept that to define objectives, either precise and concrete or broadly cognitive and behavioural, may not be difficult, but to determine whether or not these objectives have been achieved by the consumer or, preferably, by the partner in the educational exercise, is not so easy. Many medical schools in Europe and elsewhere simply present the student at the end of his course with a multiple choice question paper, an excellent discriminator in relation to knowledge. This, however, is totally insufficient in the view of the GMC's education committee as it is thought to be essential that clinical skills, as well as an ability to communicate with patients and to handle them sensitively, must be shown in the qualifying examination, which must also involve external examiners.⁶ How these aims are best achieved and the exact format of the examination are left to individual schools. Some depend on essay as well as multiple choice questions and on clinical examinations with patients in all major disciplines, whereas others prefer an integrated examination combined with carefully structured in course assess-

Further, because medical science and social structures are dynamic and not static, the doctor will need to be able to adapt to change throughout his career and the process of basic medical education should prepare him for this."

The EEC dimension

Under the Treaty of Rome, any national of a member state of the European Economic Community (EEC) graduating in medicine has the right of free establishment in any other EEC country.

In 1975 the council of the EEC adopted two directives relating to that right, and also established an advisory committee on medical training. The advisory committee on medical training was constituted of three representatives (with three alternates) from each member state, one representing the elected profession, one the universities and faculties, and one the competent authority responsible for regulation of the profession. As Dahrendorf pointed out, we in the UK have the privilege of being self regulating, whereas in many of the other EEC countries the medical profession is regulated by the government.¹⁰

A fact which soon became apparent was that, because of the legal right of students graduating from high school in many member countries to undertake any university course of their choice, numbers of medical students had increased hugely, to the detriment of their training and experience. In the table, appended to the first report published by the advisory committee on medical training on basic medical training, figures were given of the population of the individual states, the numbers of doctors in active practice in each, and for medical students in training. I have added to this figures for practising doctors in relation to population for 1980 but no comparable recent figures for medical student numbers are available. In 1975 the ratio of medical students to population varied from 1/312 in Italy to 1/2997 in the UK; and the figures clearly show a striking increase in the numbers of doctors in active practice.

That the UK has not seen a massive influx of doctors from other EEC countries is related principally to the fact that the NHS is almost a monopoly employer and that every appointment in the UK other than in private

practice is made by open advertisement and competition, and secondly (somewhat paradoxically) to the fact that, despite the huge overproduction of doctors in many EEC countries, medical salaries in the UK are still appreciably lower than in most other states. Fortunately this serious manpower problem is now recognised by departments or ministries of health and education in many member states and attempts are being made in some to introduce numerus clausus (restricted admission) for medical students.

The various reports of the advisory committee on medical training, conveyed through the European Commission to the member states, seem already to have had some influence and if wholly accepted will undoubtedly reduce student numbers and improve standards in future. I would commend in particular the first such report, on general tendencies in basic medical training and that on the clinical training of doctors, which was also adopted unanimously by the committee in November 1978. These reports made specific recommendations about theoretical and clinical training, its content and delivery, which corresponded in many respects to the principles enunciated in the GMC 1980 recommendations.

Research in medical education

The conference held by the Association for the Study of Medical Education in December 1984 on research in medical education highlighted several salient problems. Firstly, there is much scepticism within the medical profession about the value of such research. Secondly, educational researchers are discouraged by the lack of any suitable organisation to which they can apply for research grants since the Economic and Social Science Research Council regards the subject as falling outside its ambit, and the Medical Research Council, in a climate of savage reduction in its finances, has not felt able to give it priority. In consequence, more reliance has been placed on so called "common sense" than on objective study when taking decisions about teaching methods and curricular content. This is surprising in a profession that otherwise takes such care to evaluate its scientific and professional work.

The scepticism felt by many medical teachers was exemplified by the series of articles published by Roddie.¹¹ His theme was "Clichés in medical education" and he challenged what he saw as trendy ideas based on poorly validated educational principles. He challenged those directly concerned with medical education to prove the validity of their concepts and to convince him that the products of the types of education they favoured were in any way superior to those produced by a more traditional process.

The ASME conference clearly indicated that those concerned with educational research have noted the comments and criticisms such as those so clearly enunciated by Roddie, by accepting that curricular change is not an end in itself but must demonstrably have an end point which can be assessed. It was also evident that instruments are now readily available in educational research in the broad sense (not just in medicine) to evaluate the results of different methods of teaching and to compare them. Coles concluded, for example, from a carefully designed study carried out in one medical school that at the end of a course of preclinical training students were usually unable to recall detail in the basic medical sciences which they had learnt one year earlier.¹² Nevertheless, after a year of clinical training and experience, during which the relevance of that information had become more apparent, they were more ready to reacquire and use that fundamental knowledge which had not seemed of such importance. By contrast, students trained in another medical school with a "problem solving" type of curriculum (where they had been taught the clinical relevance of what they were learning in basic science) maintained throughout their ability to recall details of that education.

Harden, however, at the same conference, gave a timely warning that carefully designed scientific experiments which compare learning achieved by one technique as against another may produce results which are plainly statistically significant but not necessarily of practical value.¹³ He compared results obtained with a carefully programmed teaching machine with those produced by an equally carefully written programmed text. The programmed text produced a result as good or even better than the much more expensive teaching machine. He therefore persuaded his faculty to purchase many copies of the programmed text, only to find that, while students were much taken by the excitement and novelty of using the

machine, the programmed text (even though demonstrably as good), remained unused and unconsulted. Hence, in designing educational research so as to plan curricular change, we must not only consider comparability of different methods of learning but (as in pharmacological studies) also take into account student (like patient) compliance.

Unanswered questions

There remain many unanswered questions which those interested in all aspects of medical education must consider. These include, firstly, what techniques are available for assessing the outcome of such education and how acceptable are these likely to be to teachers and students alike? Secondly, should doctors interested in educational research try to deploy these methods unaided, or will it always be necessary to have the help of those trained in educational techniques? Thirdly, how may faculties of medicine (in relation to basic education) and royal colleges (in relation to postgraduate education) be persuaded to accept and consider the findings of such research in reaching decisions about educational problems and their evaluation?

Conclusions

Whatever the answers to these questions may prove to be, we clearly cannot be complacent. The quality of the medical students whom we now admit for training to our universities is exceptional and we have good reason to take pride in the competence of the doctors our medical schools produce. Nevertheless, education in a subject as challenging and ever changing as medicine must show true dynamism, with a willingness and ability to change not for change's sake but as a response to the changing needs of our patients and of society and to the continually exciting developments occurring in medicine and medical science.

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A man complains of bilateral tingling that extends from the shoulder to the finger tips during micturition. He describes its onset as being "like a wave." What might be the significance and explanation of this phenomenon?

This symptom is probably not directly related to the act of micturition itself, and an organic cause such as cervical spondylosis or cervical rib should be excluded. The forward angulation of the neck often adopted during micturition would serve to explain the symptoms occurring at that time, particularly if micturition is prolonged or accompanied by straining. Possibly the problem is psychogenic.—J C GINGELL, consultant urologist and lecturer in urology, Bristol.