

Academic medicine: problems and solutions

The Academic Medicine Group

The Academic Medicine Group is an affiliation, consisting mostly of doctors, drawn from many institutions whose common interest is the maintenance of high standards of clinical training and scientific research in medicine. The group was formed after a meeting held at the Royal College of Physicians in October 1986 under the auspices of the University Hospitals Association at which it was pointed out that academic medicine was not represented through any single forum and its case had to be presented through spokesmen for many different organisations. Such splintering diminished the impact of the academic voice. It was hoped that the formation of this group would allow our common interest in academic medicine to be expressed through a single body.

The group has met at regular intervals over the past 18 months. The first product of its deliberations was this document. There is cause for genuine concern about the plight of academic medicine, threatened as it is by curtailments in funding from both the University Grants Committee and the NHS and by new limitations on the recruitment of young academic doctors. In drawing attention to these problems this document emphasises the positive steps that should be taken to safeguard the future of academic medicine. Many changes can be effected within and by the academic institutions themselves; these steps are clearly defined. Further action is required from outside, particularly to redress the damage that has been done over the past decade. The document seeks to focus attention on a serious problem that threatens the future of all medicine whether practised in academic or non-academic institutions.

The Academic Medicine Group will continue to analyse specific problems within academic medicine and will make recommendations about their resolution. The group is currently analysing the impact on teaching and research of the government's recent white paper on the NHS.

Introduction

Academic medical staff in the United Kingdom have most of the responsibility for medical undergraduate education and for research; they also play a substantial part in continuing education and postgraduate training. They are almost always employees of university medical schools or postgraduate institutes, and to a lesser extent of the Medical Research Council (MRC) and other research funding organisations. Most also play an important part in the service work of the NHS, holding honorary contracts with health authorities.

Though few people are unaware of the problems facing the NHS, the difficulties of our medical schools are less well appreciated. The health of academic medicine is in serious jeopardy. In 1985 the situation in London had become so difficult that the university asked the General Medical Council to inform the government that unless reduction of funding was

stopped acceptable standards in medical education could not be maintained. The council itself has pointed out that if standards of medical education are further endangered some medical degrees may no longer be eligible for registration under the Medical Act.

High standards of clinical care within the NHS depend on how doctors and other staff are trained and how well and rapidly they assimilate the benefits of research. Although until recently the NHS has provided an admirable environment for medical schools to undertake both research and the training of doctors, it has paid little direct attention to these activities, which have lain at the heart of its effectiveness.

The problems of research have been examined by the House of Lords Select Committee on Science and Technology and we agree generally with its analysis. We have therefore summarised only some of the problems in research in order to put the proposed solutions into context. We also describe problems of medical education, which were not within the select committee's remit. Nevertheless, the main purpose of this paper is to encourage informed discussion and to propose solutions to these problems.

Problems created by national trends in education, research, and the NHS

PRECLINICAL DEPARTMENTS

New developments in science are encouraging considerable changes in the organisation of preclinical departments on more cross disciplinary lines. At the same time such departments are increasingly concerned in research entailing clinical practice. Many clinical teachers, however, still fail to appreciate the value of basic science in clinical medicine and pass this attitude on to students. Thus the relation between the preclinical and clinical departments is still uneasy in many universities, and the relevance to clinical science of what is taught in the preclinical departments is often questioned. The staffing of preclinical departments in medical schools has changed radically: the proportion of those with medical qualifications has fallen dramatically, and some departments now operate without any medical graduates. This has led to an increasing divergence between basic science and clinical departments in universities. The decreasing number of clinically qualified teachers in preclinical departments is also leading to a separation of the new technology from the bedside. A continuing recruitment of medical graduates for preclinical departments is unlikely, and there is therefore an urgent need to bring the preclinical and clinical courses together more effectively. Such developments might reduce the overload of information to which medical students are subjected.

REDUCTIONS IN STAFFING OF CLINICAL ACADEMIC DEPARTMENTS

The most important effect of reduced university funding has been a progressive reduction in the

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number of academic posts funded wholly by universities. Between 1979-80 and 1983-4 the total number of medical academic full time staff fell from 2165 to 1728, and in 1986-7 it fell further to 1652. Some 513 posts (25% of all posts) have been lost and there have been concomitant losses of non-clinical basic scientists. It is not possible to obtain exact figures for the loss of basic scientists doing medical research, but the proportional loss of these staff in preclinical departments has been comparable, though less in total number. The Committee of Vice Chancellors and Principals in a separate assessment estimated that between 1980-1 and 1986-7, 551 full time clinical academic staff who were funded wholly by the universities were lost from the country's 18 universities with medical schools; their replacement would cost about £14m each year.

INCREASED DEPENDENCE ON SHORT TERM SUPPORT FROM OUTSIDE

At the same time, however, the *Universities Statistical Record* shows that the number of full time academic staff not wholly financed from university sources—that is, funded by the NHS, the Medical Research Council, the medical charities, or industry—has risen from 749 in 1980-1 to 1855 in 1986-7. Some schools have found it difficult to maintain standards without NHS funds. Nevertheless, most staff funded from outside sources are on short term contracts for defined research projects in specific subjects; they do not compensate for the full time university staff who have been lost, particularly in clinical departments, and can contribute only in a limited and ephemeral way to the development of research teams of critical mass and scientific excellence and to teaching. The availability of even these short term contracts for clinically qualified staff will be considerably curtailed in the future. Furthermore, academic staff appointed with NHS funds often bear such heavy service commitments that their opportunities for teaching and research are seriously curtailed.

CONSTRAINTS IMPOSED BY "ACHIEVING A BALANCE"

In 1987 the Department of Health and Social Security published its document on medical staffing *Achieving a Balance—a Plan for Action*. The DHSS's overall aim was to reduce considerably the number of junior staff training in the NHS, to increase the numbers of consultants, and to create a new career grade. The impact of these proposals on clinical academic departments will be appreciable: there will be fewer NHS registrars and, because of redistribution, fewer senior registrars contributing to teaching and research in the teaching hospitals. At the same time the number of honorary clinical posts allocated to those holding comparable positions as lecturers in academic departments or as research fellows is to be reduced and strictly controlled. *Achieving a Balance* therefore poses another threat by further reducing the number of clinical academic staff in clinical departments. In addition, as NHS consultant posts in teaching hospitals became vacant they are often not filled, leading to a further reduction in staff available for teaching in the medical schools. Furthermore, the aim of *Achieving a Balance* in effectively increasing the number of consultant posts has not been realised.

The changes in registrar and senior registrar appointments are being reviewed nationally by the Joint Planning Advisory Committee, which has a means for conveying the views and concerns of academics at its meetings. As effective implementation of its decisions will be a matter for the different health regions academic interests must be fully taken into account in all health regions, which vary considerably in their

concern for academic interests. The Central Manpower Committee, however, also plays an important part in determining the distribution of medical staffing between the NHS and medical schools. We are concerned that academic medicine is at present poorly represented on that committee.

PROBLEMS OF RECRUITMENT TO ACADEMIC MEDICINE

Most of those who enter academic clinical departments as research fellows or lecturers do so to spend a period in active research. Most then re-enter the NHS, often having obtained a higher degree. Although this system provides extremely valuable postgraduate education and experience for many doctors, the health of academic medicine depends on the minority who remain in university departments or MRC units. This is now perceived to be a less attractive option. This partly reflects the current problems of the universities and the prospect of departments being closed. A number of professorial chairs have been endowed by the larger charities—for example, the British Heart Foundation and the Imperial Cancer Research Fund—but, although a substantial additional number of senior lecturers has also been funded by charitable bodies, these posts do not have the permanence of established senior lecturer or hospital consultant posts.

We are not pleading for tenure for senior clinical academics but pointing out that an important and continuing research programme may require long term commitment. The career structure in clinical science has to compete with a parallel one in hospital medicine and general practice, and any disparity in prospects between the two results in an internal "brain drain" from university to health service posts. It is, however, becoming difficult for senior doctors with a background in clinical research to move to health service consultancy. Many recruits to academic medicine would wish to maintain the flexibility in career structure that until recently preserved that option.

One attraction of a career in an academic department has been the opportunity to pursue a particular line of research without jeopardy to a clinical career. This is still possible when research springs directly from clinical work—for example, research in the development of new imaging techniques or techniques required by cardiology. The emergence of specialist accreditation, however, has made it much more difficult in some disciplines for clinical scientists whose interests transcend the boundaries of traditional clinical disciplines. The implementation of *Achieving a Balance* may serve further to entrench rigid training programmes. These considerations are particularly serious in some of the most productive topics of modern biological research—for example, cell biology, molecular genetics, and immunology, where special scientific skills may be applicable to a range of disorders extending across several of the conventional career pathways. Potential recruits may thus see the need for clinical and research careers to diverge.

The clinical service commitment borne by most academics may prevent adequate time for research, and this has been a particular problem during the recent cutbacks in NHS funding. The increasing involvement of academics in routine hospital service work, to the detriment of their research, is the direct result of inadequate staffing of clinical departments. We do not wish to protect academics from clinical work, but we think there should be sufficient staff to carry it out. A great attraction of academic medicine has been the ability to apply scientific techniques furthering clinical practice and any attempt to split the two would be counterproductive in its effects on recruitment. But at the same time the needs of research may demand a period in a scientific laboratory away from clinical practice, which, with the present con-

straints on the health service and the universities, is often impossible.

The government has stated its firm commitment to the maintenance of parity between the salaries of NHS staff and those working in clinical academic departments. Because of the yearly struggle to maintain parity until now potential recruits to academic medicine have seriously feared that it would eventually be lost. These fears have contributed to the reluctance to devote careers to academic medicine. We hope that the government's statement will help.

The effects of loss of parity are evident in preclinical departments of medicine schools, which are now largely denuded of medical graduates. Loss of broad comparability would have an equally disastrous effect on clinical departments. Parity for clinical academic staff has not been maintained in another respect; financial help given to newly appointed NHS staff to cover house purchase and removal expenses greatly exceeds that given by the universities.

The increase in private practice is widening the gulf between the earnings of NHS employees in teaching hospitals with the right to private practice and their academic counterparts. Many medical schools are now permitting limited private practice for their academic staff. Such schemes should be subject to stringent controls so that time and commitment to research and teaching are not eroded.

People entering academic medicine as a career will do so only if they perceive some reward other than the potential financial gain from private practice. Obvious non-financial rewards are success in research and achieving national or international recognition in their chosen subject. The possibility of success depends entirely on a proper infrastructure for research, which includes well equipped laboratories, technical support, and a proper career structure. If prospective entrants to academic medicine do not perceive that these essential elements exist, they are unlikely to forego the alternative, more material rewards.

PROBLEMS FOR TEACHING

The relation between the medical schools and the NHS has formed the basis for clinical medical education. We are concerned that whatever changes may be introduced into the funding of medical care—including growth in private practice, internal marketing, or any other administrative changes in financing—should not jeopardise medical education.

Section 51 of the NHS Act of 1977 describes the duty of the Secretary of State to make available such clinical facilities for medical teaching and research as he considers are reasonably required by the universities. We therefore welcomed the decision of the DHSS to set up a steering group on undergraduate education initially under the chairmanship of Mr Michael Partridge and now of Sir Christopher France, although we also hope that the needs of postgraduate education are not neglected as undergraduate and postgraduate education are a continuum.

Clinical teaching in medical schools in the early phases of the clinical course still relies on students interviewing and examining sufficient numbers of inpatients and having the opportunity to follow them up daily during their illness. Only by using inpatients at this stage can teaching staff provide sufficient continuous supervision to ensure that the skills of clinical method are learnt consistently and systematically. To allow such supervision this early phase of clinical teaching should take place in the main teaching hospital. Nevertheless, cuts in NHS hospital expenditure are leading to an unacceptable loss of facilities for teaching and research, including a substantial number of acute beds in teaching hospitals.

Other important training of undergraduates takes place in outpatient departments and general practice. At present there are inadequate teaching facilities in outpatient departments, and there are important logistic problems in lengthening the average time (four weeks) spent in undergraduate general practice teaching.

CLINICAL RESEARCH

Though more data on clinical research are required, the quality of research in British clinical academic departments is probably not increasing as fast as that in other countries. The reasons include not only lack of funding but also insufficiently imaginative and flexible policies for organising academic medicine within the universities.

Immediately after the war and up to the end of the 1960s clinical research was of the "whole patient physiology and pathophysiology" pattern. The United Kingdom was particularly successful, as reflected by the excellence and strong international standing of centres typified by the Royal Postgraduate Medical School. In the 1970s, after the revolution in biology caused by DNA technology, the emphasis of medical research changed, the accent now being on the study of disease at the cellular and molecular level. This did not mean the end of research orientated towards patients, but to take full advantage of the developments in the basic sciences first class academic departments needed to combine good bedside investigation with first class laboratory work employing increasingly complex science, and few academic departments succeeded in doing this.

Enough progress has now been made, however, in the application of cell and molecular biology and of advances in the neurosciences to the study of human disease to indicate the future pattern of clinical research. Internationally competitive academic clinical departments will need a broad range of skills, including top class clinical investigation, combined with advanced basic science. There is little sign that many departments can meet these demands.

Current shortcomings of clinical academic departments

DECLINE IN CLINICAL RESEARCH

Several factors may be contributing to the decline of clinical research in this country: the limited size and scope of clinical academic departments; the lack of adequate career structures for particularly talented clinical scientists; and the constraints of the present system of undergraduate and postgraduate medical education.

The size of most British academic departments now is often inadequate to meet the demands of modern medical education and research. The department usually has a professor and perhaps one or two tenured senior staff, a lecturer or two, and the odd technician. This handful of people is expected to run a busy clinical service, be responsible for organising undergraduate and postgraduate teaching, and do research. Young clinicians are brought into such environments on short term research fellowships and good science is expected to emanate from these groups that are small and have a rapid turn over. This kind of organisation was adequate when medical research was simply an extension of day to day clinical practice or the application of simple and well understood physiological principles. It is inadequate when the more complex techniques of the modern biological sciences are to be used. The widespread inability of our clinical academic departments to respond adequately to changes must be judged against this background.

Our educational system often fails to promote careers for unusually talented and original undergraduates. It is becoming more difficult to do intercalated degrees, the importance of which was emphasised in a recent study of research achievement in Britain. An early introduction to scientific method is helpful to future medical researchers. Good junior clinical research posts almost invariably go to those who have shown their intellectual capacity and interest in research by doing an intercalated BSc or BMedSci. The MRC is progressively reducing its financial support. Unless the intercalated year is part of the course, as at Oxford and Cambridge, funding from the local authority is generally refused. This anomaly needs correcting. About 25-30% of students at other medical schools could benefit from an intercalated BSc course, and all the medical colleges could provide them. But funding is now becoming extremely difficult, and this will inevitably discriminate against students with limited financial resources. Furthermore, none of our clinical schools offers anything like the MD-PhD courses that are now commonplace in most of the top class American schools. Particularly talented students are already put off the academic ladder because of the lack of any proper career prospects. All they can see is the slim possibility of a job in an MRC establishment or in one of the cancer foundations, but they can see no possibility of a career in research in a clinical academic department.

A great strength of academic medicine in the past has been its capacity to attract some of the most gifted students and postgraduates who wish to carry out work that is intellectually taxing. Increasingly, however, careers in academic medicine and in hospital medicine are losing their attraction. Talented individuals go elsewhere, particularly into general practice, which has many attractions as a specialty in itself and also has a shorter training period and the opportunity to have a permanent salary and home earlier in the career.

FUNDING OF RESEARCH

The funding of research in academic medicine comes primarily from the Medical Research Council, the medical charities, or industry. During the past decade money allocated by the MRC to clinical research on long term programmes has been progressively reduced: the number of units of the MRC and programme grants devoted to clinical subjects have both diminished. The medical charities support academic medicine with some £20-30m more than the current MRC allocation. Much of this, however, is devoted to short term projects, and little is being channelled into career posts. Furthermore, there is an overemphasis on subjects that rank high in the public perception—for example, heart disease and cancer. Cinderella areas such as psychiatry, sexually transmitted diseases (other than AIDS), or diarrhoea are very much more difficult to fund from the private sector.

Support for senior researchers has been limited. The MRC has only four clinical career professorships in the country, although the impact of the British Heart Foundation has been more substantial. Though its senior lectureships are of limited tenure, the Wellcome Trust is now interested in channelling money into longer term support.

There is an urgent need for universities to agree about charging for overheads with respect to money granted by charities for research. Nevertheless, universities cannot do this until they know how far the University Grants Committee (or the Universities Funding Council in future) will take account of income

from charities when determining the allocation of recurrent resources to universities.

WHAT ACADEMIC MEDICINE HAS TO OFFER

A detailed analysis of almost any important discovery in medicine shows a complex web of origins of research going back many decades—often a pathway from basic science through industry to clinical academic departments and then to medicine at large. These are not simple linear pathways, and observations in clinical departments have often initiated the trail or profoundly influenced its development. Analyses of discoveries show that academic medicine, both preclinical and clinical, is essential for the advancement of medicine.

The last two decades of the twentieth century will probably be recognised as a period of extraordinary fertility in biological and biomedical science, promising dramatic developments, both curative and preventive, in bacterial, viral, and parasitic diseases; cancer; autoimmune disease; the degenerative disorders in inherited disorders of metabolism; and even in chronic mental illness. Academic medicine can realise these hopes, given appropriate resources and the will to reorganise. An important element in these developments is the work of the distinguished departments of clinical epidemiology that have developed in the United Kingdom.

Quite apart from these prospects, however, our medical schools have an important influence on the work of universities. Although medical education is expensive, universities fortunate enough to have medical schools prize them greatly. In addition to being a manifestation of the university's links with its surrounding community, the presence of a medical school strengthens and enriches the work of a university. Examples include the links between preclinical departments and other disciplines of biological science; medical physics and mechanical engineering; clinical departments and computing science and statistics; psychiatry and psychology; community medicine, sociology, and, increasingly, economics; forensic medicine and law schools; clinical departments and departments of philosophy and ethics.

As well as its prime functions of teaching and improving the effectiveness of medicine, academic medicine can contribute appreciably to the NHS by identifying the most efficient use of resources. The commercial application of innovations in medical research is also an important contribution to the national economy.

Medical schools are continually redesigning their undergraduate educational activities to take account of new principles, ethical and social considerations, and attitudes. The objective of undergraduate education is to provide a conceptual launching pad for careers that may last 40 years. The importance to the health of the nation of flourishing medical schools teaching a spirit of critical inquiry and professional competence needs no emphasis.

Clinical academic departments share an important role with the NHS in training future consultants. In addition, the successful completion of a period in research is regarded as essential for most consultants training for work in the NHS; they are thereby better equipped to evaluate the results of future research and thus its relevance to patients. Most research training is undertaken in clinical academic departments in medical schools or in NHS departments in teaching hospitals, which are closely linked with academic units. Academic medicine should be able to continue to offer this essential component of the training of NHS consultants.

Changes that should be effected by academic medicine

CHANGES IN EXISTING STRUCTURES

The organisation of clinical academic departments in the teaching hospitals of the medical schools requires radical change. At present professors in clinical subjects are not heads of their clinical departments, being simply part of one firm among several others headed by NHS consultants who are of equal status. We are interested in the argument that clinical professors should not only head their own academic department but also be chiefs of service within their teaching hospitals on the American or Hammersmith model. This proposal merits serious consideration.

The organisation of research in many medical schools also needs to be reconsidered. Clearly no medical school can mount internationally competitive research in more than a limited number of topics. Each school should have mechanisms for selectively channelling resources (staff, equipment, and consumables) for research into these subjects and should tell grant giving bodies the disciplines in which it is "majoring." These selected subjects will inevitably concern a multidisciplinary mix of researchers and will not be confined to traditional departments organised either by system or discipline—for example, cardiology, gastroenterology, anatomy, physiology, and biochemistry. Given the current organisation of medical practice, some of these traditional departments may, or may not, be essential for undergraduate or postgraduate teaching, or both. But if they are essential for these purposes—and therefore need to be funded for teaching—it is illogical also to fund them for modern biomedical research, for which a different structure is likely to be better. Funding for such multidisciplinary research groups should therefore be allocated separately.

We envisage that the research groups might each be orientated towards the solution of a specific set of problems. There are clearly alternative strategies. A research environment can be based on a critical mass of skills in a specific discipline of technology. The molecular biology "research hotel" at Oxford is an excellent example of this approach: teams of workers who wish to use molecular biological skills and equipment for their own problems may "take up residence" in the hotel and share equipment.

Implementing changes such as we have suggested will require medical schools to set up research committees with effective powers and resources comparable with those available to curriculum committees that supervise teaching. Schools might also consider appointing subdeans or directors of research with overall executive responsibility for research management.

Large multidisciplinary groups may also present an attractive environment for non-clinical scientists, who are essential for the future success of clinical research and who currently may feel isolated in small clinical academic departments. Such groups will establish mutually profitable connections with other academic institutes, as well as with industry, notably the pharmaceutical companies and those concerned with medical instrumentation, biomaterials, and information technology.

The selection and training of clinical staff with a particular aptitude for research are crucial. Medical schools should consider offering the most able of their undergraduates combined MB-PhD programmes, which would enable them to graduate with both a scientific training to PhD level and a medical qualification.

Research committees will have to establish mechanisms for ensuring that "seed corn" money is provided

to launch particularly promising new research ideas not falling into the purview of their main research groups. Committees should also be able to ensure that the best use is made of space and expensive equipment for research.

In making these suggestions about the reorganisation of research within medical schools we emphasise that we do not support the idea of R, X, and T institutes as put forward by the Advisory Board for Research Councils. In medicine the interdependence of research and teaching is so profound that any idea of a medical school devoted solely to teaching is unthinkable. We have suggested ways of restructuring the management and funding of research and teaching within individual schools.

There is a widespread impression that as postgraduate training proceeds in the NHS, and indeed in clinical academic units, trainees become increasingly divorced from the basic science of their specialist disciplines. If this process continues future consultants will have only a superficial understanding of treatment and will be increasingly unable to appraise new information in their own specialties, let alone in medicine in general. Medical oncologists have recognised this recently and have included mandatory basic science courses in training programmes for senior registrars. We suggest that the attention of higher training committees should be drawn to this point.

Many of the higher training programmes of the royal colleges are inflexible. The need for accreditation forces most would be academic clinicians into one of a few fixed training programmes. This interferes severely with opportunities for trainees to undertake research or training in cross disciplinary or unusual topics, and the regulations are thus ill suited to academic needs. One of the higher training committees (the Joint Committee for Higher Medical Training) has recently recognised this difficulty by setting up a special committee to consider unusual training programmes. The other higher training committees might be asked to consider similar mechanisms.

In undergraduate training there is the potential to explore the much greater use of outpatients for teaching and thus overcome the problem of reduced bed numbers. Undoubtedly, future hospital medical practice will move in this direction and medical schools should respond to this challenge. This requires both a willingness to change—which is partly in the hands of the medical schools and teaching hospitals—and convincing the NHS that it is worth while funding the better designed outpatient departments that will be needed and including teaching facilities. Medical schools should re-explore with their departments of general practice the logistics and academic implications of making better use of this largely untapped teaching resource.

In many medical schools some of these suggestions are being explored or at least being considered. The movement is sufficiently great to suggest that academic medicine is grasping the need for self help by re-organisation. Every encouragement should be given to this momentum. We consider, however, that external help is also essential.

Action required for which additional help is needed

CAREER STRUCTURE

The most immediate problem is career structure. Two types of individual should be considered. Firstly, talented individuals who wish to pursue careers in academic medicine: our professors and full time research workers of the future. Such is the pressure of clinical commitment that it is often difficult for them to

obtain a few years dedicated to developing the skills to carry out clinical research. Increasingly, they also need to spend two to three years working full time in a basic science laboratory. Secondly, there are those who wish to pursue a clinical career in a specialty but who wish to do a year or two of research as part of the education process.

In addition, if an appreciable number of clinical researchers are to apply molecular biology and other subjects such as cell biology or modern pharmacology to their research problems they will need two to three years in the laboratory after they have started on broad paths of medicine, such as clinical medicine, surgery, pathology, and radiology, without detriment to their future careers. They then need to have a guaranteed mechanism for re-entry to clinical disciplines. Fellowships on these lines are offered by the Imperial Cancer Research Fund and by the MRC, but more are required. A considerable number (roughly 50) of combined MB-PhD programmes need funding. Furthermore, to encourage the interest of the more able undergraduate student in research, public funding of intercalated BSc degrees needs to be restored at least to its previous level.

A period abroad is particularly valuable for academic trainees because it broadens their clinical horizons as well as giving them research opportunities. The current decline in travelling is regrettable.

The most urgent requirement to revitalise British academic medicine is creating career posts for particularly talented research workers who wish to spend most (about 80%) of their time in research. In the same way that *Achieving a Balance* seeks to increase the number of consultant posts in the NHS, so also in the academic world there is a need for an increase in senior posts. We support the submission by Sir David Weatherall and the Association of Clinical Professors of Medicine that 250 career posts should be created in academic medicine, with an equally strong requirement for up to 100 career posts for basic scientists working in clinical academic departments. These should be phased in over several years. The support for such a development could well be channelled through a similar organisation to that which was organised jointly by the University Grants Committee and the MRC for "new blood" lectureships. In view of the pressure on existing clinical academic staff caused by their clinical service commitments there would be little difficulty in accommodating an additional 250 clinical academic staff within the existing clinical base in teaching hospitals. A small start has been made by the recent announcement by the University Grants Committee of 50 new senior clinical academic posts.

We agree with the House of Lords Select Committee's view that the NHS should play a greater part in supporting research and development, without detriment to the funding of the MRC. We are not sure that the establishment of a National Health Research Authority is necessarily the best way of achieving this. We also believe, however, that it is important to maintain the diversity of sources other than those of the University Grants Committee for research support—that is, the research councils and charities, industry, the NHS, and Department of Health—and that no monolithic structure should be allowed to develop.

We believe that parity in salary for clinical academics with their NHS colleagues must be maintained and that expense allowances should be improved. The NHS must recognise its responsibility for providing adequate teaching facilities for both undergraduates and postgraduates. The Department of Health should liaise with the Department of Education and Science and the medical schools to produce guidance for health authorities on the design of capital developments in both teaching and associated hospitals and their dis-

tricts so that educational requirements may be catered for fully.

Recommendations

We have summarised the widespread concern about the future of academic medicine in the United Kingdom and indicated the serious effect on the future development of health care that might be expected if the present situation were allowed to continue. Our recommendations for revitalising academic medicine are summarised below.

RECOMMENDATIONS THAT CAN BE IMPLEMENTED BY ACADEMIC MEDICINE AND TEACHING HOSPITALS

- (1) Teaching must take place in schools where high quality research is in progress.
- (2) Funds for teaching should be allocated separately from those for research.
- (3) Teaching must continue to be rooted firmly in basic science. Adequate content of basic science in postgraduate as well as undergraduate programmes should be ensured.
- (4) Medical schools should help pioneer the move towards outpatient medicine and the corresponding reduction of inpatient care; they should consider in detail how undergraduate education can be developed on this basis.
- (5) Ways of making better use of potential teaching resources in general practice should be explored.
- (6) The proposition that academic heads of departments in teaching hospitals should have overall responsibility for service provision in their areas requires discussion.
- (7) Each medical school should define the limited number of areas in which it perceives that it can mount internationally competitive research.
- (8) Each school should make its selected areas known to the large funding bodies.
- (9) University Grants Committee and Universities Funding Council funds for research should be allocated by medical schools to the multidisciplinary inter-departmental research groups concerned with the selected subjects.
- (10) Medical school research committees should have sufficient power and resources to implement the above changes effectively.
- (11) Schools should consider appointing subdeans or directors of research with overall executive responsibility for research management.
- (12) Research committees should establish mechanisms for providing "seed corn" money to pilot particularly promising research ideas that do not fall within the purview of any of their established groups.
- (13) Research committees should ensure the best use of space and equipment on the campus.
- (14) An alternative or complementary strategy to research groups orientated towards the solution of a set of related problems is to base a research environment on a critical mass of expertise in a specific area of technology—for example, the Oxford molecular biology "hotel".
- (15) Medical schools should consider offering combined MB-PhD programmes to the most able of their undergraduates.

RECOMMENDATIONS FOR WHICH OUTSIDE HELP IS NEEDED

- (16) A proper career structure is needed for particularly talented medical research workers. Some 250 career

posts are required for clinical academic staff who wish to devote most of their time to research.

(17) Similarly, 100 career posts are needed for basic scientists working in clinical research groups.

(18) Funds are required for establishing approximately 50 combined MB and PhD programmes and for restoring adequate public financing of a sufficient number of intercalated BSc degree courses to its previous level.

(19) The NHS must take a much greater part in the support of research and development.

(20) Basic clinical teaching will continue to require attachment of students to a substantial number of inpatients. At this early stage it is important to ensure that this attachment can take place in the main teaching hospitals.

(21) The NHS must be persuaded of the need for much better teaching facilities on its premises.

(22) The erosion of staff time for both teaching and research caused by the implementation of *Achieving a Balance* must be stopped and corrected.

(23) There should be better representation of academic medicine on the Central Manpower Committee.

(24) Better mechanisms should be found for ensuring that academic needs are considered fully when staff are allocated within health regions.

(25) The higher specialist training committees should be asked to make their requirements for accreditation more flexible so that future clinical academics are not constrained to a relatively few rigid training programmes.

(26) Parity of salaries with NHS colleagues must be maintained for clinical academic staff and their removal expenses should be provided.

Members of the group are as follows:

Sir Raymond Hoffenberg, (**chairman**), president, Royal College of Physicians; Mr L D Abrams, University Hospitals Association; Dr P A J Ball, consultant physician; Sir Christopher Booth, president, Royal Society of Medicine; Professor A J Buller, Muscular Dystrophy Group of Great Britain; The late Professor C G Clark, former professor of surgery at University College Hospital; Dame Barbara Clayton, honorary research fellow in metabolism, University of Southampton; Professor R D Cohen, professor of medicine, The London Hospital Medical College; Miss Barbara Crispin, assistant secretary, Committee of Vice Chancellors and Principals; Professor C J Dickinson, professor of medicine, St Bartholomew's Medical College; Professor Sir Colin Dollery, director, Department of Medicine, Royal Postgraduate Medical School; Dr D C Evered, second secretary, Medical Research Council; Professor T W Glenister, dean, Charing Cross and Westminster Medical School; Professor G S Kilpatrick, vice provost, University of Wales College of Medicine; Dr J G G Ledingham, May reader in medicine, University of Oxford; Professor N McIntyre, professor of medicine, Royal Free Hospital School of Medicine; Professor G P McNicol, Committee of Vice Chancellors and Principals; Professor M F Oliver, Duke of Edinburgh professor of cardiology, University of Edinburgh; Professor M J Peckham, director, British Postgraduate Medical Federation; Professor D K Peters, regius professor of physic, University of Cambridge; Dr D A Pyke, registrar, Royal College of Physicians; Professor J P Quilliam, former chairman, Medical Academic Staff Committee of BMA; Dr C J C Roberts, former chairman, Standing Committee of Members, Royal College of Physicians; Professor D A Shaw, dean of medicine, University of Newcastle upon Tyne; Sir Maurice Shock, former chairman of the Committee of Vice Chancellors and Principals, rector of Lincoln College, Oxford; Dr C L Smith, British Medical Association; Professor J D Swales, chairman, Federation of Associations of Clinical Professors; Professor Sir David Weatherall, Nuffield Department of Clinical Medicine, John Radcliffe Hospital, Oxford; Sir David Innes Williams, chairman of council, Imperial Cancer Research Fund; Professor J D Williams, professor of medical microbiology, The London Hospital Medical College; Dr P O Williams, director, Wellcome Trust.

Obstacles to acceptance of clinical decision analysis

J I Balla, A S Elstein, Caryn Christensen

Clinicians work in an environment characterised by uncertainty and, for the most part, use intuitive methods to make choices between strategies in diagnosis and management. It comes as no surprise that they are not always successful in their choices and improvements should be looked for and welcomed. One approach would be to attempt to develop a prescriptive theory of clinical work with its accompanying techniques.¹ A formal method for decision making should take into account the likelihood of the outcomes of actions, the risks and benefits associated with these outcomes, and value judgments on how the patient's interests are best to be served.² The theory should make it possible to generalise from clinical experience and allow a systematic examination of the actions of clinicians within its framework.¹

Three building blocks

Clinical decision analysis is assembled from three simple building blocks, though in application these may be complex.

Firstly, 2×2 tables help us visualise the statistical properties of test results. Sensitivity (true positive rate)

and specificity (true negative rate) can be presented in such tables—for example, how often are computed tomograms abnormal in the presence or absence of brain tumour?

Secondly, Bayes's theorem allows the calculation of: (a) the probability of the presence of a condition given certain clinical findings, and (b) the revision of probabilities associated with any given test result. For example, Bayes's theorem allows the estimation of the probability of acute appendicitis being present when there is pain in the right iliac fossa, associated with tenderness and guarding in a 21 year old woman. Or it allows us to assess what diagnostic importance in probability terms should be attached to a normal computed tomogram in a patient with headache.

Thirdly, decision trees give an explicit pictorial representation of alternative strategies. They can also incorporate probabilities and utility assessments into the options available to the decision maker. For example, a decision tree can be used to help answer the question: What is the best treatment to recommend to a patient suffering from transient ischaemic attacks in terms of the risks of the condition and those of treatment by medical or surgical means?

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