

needed to cope with new emergencies only. A planned visit to the department as this patient intends should whenever possible be made during office hours though one may have sympathy for the patient who turns up in the evening so as to avoid missing work or because of home ties with children during the day. Nevertheless, if the department is busy with an acute emergency when they arrive they may well have to wait until those patients with more urgent conditions have received attention.

A partial tear of the lateral ligament of the ankle is best treated by immediate steps to limit swelling—an elastic supporting bandage or cold compresses. Continued use of the foot is to be urged. If mismanaged, immobility and excessive exudation cause a diffuse deposition of fibrous tissue in the neighbourhood of the injury and painful limitation of movement. Deliberate exercises are then needed that many patients can do successfully themselves, although for others the encouragement and supervision of a physiotherapist are desirable. In the late stages manipulation under anaesthesia can be dramatically helpful.

Instead of tearing perhaps a few fibres of the anterior talo-fibular ligament, the ligament under tension may pull off a small piece of bone from the lateral malleolus or from the neck of the talus. Such a flake fracture is of no more clinical importance than the uncomplicated ligament tear. The detection of the fracture by radiography might even occasionally act against the patient's best interests if those responsible for treatment are overimpressed by the finding and equate "fracture" with "plaster", and thereby overtreat the injury. The malleoli are easily palpated. If there is no major tenderness or swelling over either of these bones there can be no major malleolar fracture. I am sure there is no physical indication for radiography of this injured ankle.

We do not, however, treat injuries, we treat patients. It is all too easy for an over-anxious patient to misinterpret bland reassurance by the doctor as unwillingness to take her complaint seriously or to go to any real trouble. It may be far more economical to put on an impressive show of strength at the first consultation and satisfy the patient in one move than to hastily attempt reassurance and have her repeatedly and unhappily returning in the future. I would have no hesitation in asking for the radiographs she expects so that she will have full confidence in my eventually spoken opinion that the injury is not serious. And it is, of course, just possible that the investigation will reveal something quite surprising and relevant.

Postscript to the problem

This patient was referred for radiography—which gave, as predicted, normal results. The consultation with the trainee, however, had lasted a very long time, and the next patient had complained to the receptionist about the delay. The potential for a tense morning was obviously developing; fortunately the trainee had the ability—essential for the budding general practitioner—to keep a cool head, and all settled down amicably.

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Medical Education

On training tomorrow's doctors: the Newcastle curriculum revised and reconstructed*

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In an era when knowledge is ever increasing and patterns of postgraduate training and medical practice are constantly changing the responsibility of medical educators has never been greater. Certainly the medical schools and licensing bodies are no longer required to produce on graduation a "safe doctor"; but they should provide a training on which the clinical experience of the preregistration year and the fruits of subsequent vocational training can be superimposed.¹ Nevertheless, for those intimately concerned in curriculum planning at a time

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of financial constraint, the problems of providing a medical training that is balanced yet comprehensive, scientifically adequate yet clinically relevant, and intellectually challenging without stifling initiative presents increasing problems. Fortunately, the British medical schools, despite current unease in the National Health Service, continue to receive far more applications from academically outstanding and well-motivated young men and women than they can possibly accept. Without question those students who are admitted usually have the intellectual capacity, application, and dedication to enable them to cope with whatever course we offer them, however demanding it may be. This paper aims to show how medical education in Newcastle has been shaped in the last 15 years and to describe some recent changes.

Growth in the medical school

In 1971, when I was appointed dean of medicine, we accepted 100 students a year into the second year of medical curriculum, 95 usually being admitted direct from school and five coming from

our own first (premedical) year. In 1972 we increased our annual intake to 108, and in 1974 we increased this to 130 students a year in view of the country's need for more doctors. The existing medical school, built in 1938 with accommodation for preclinical and some laboratory medicine departments, was designed for an intake of 60-65 students a year and is now substantially overcrowded. Nevertheless, with the willing collaboration of staff and students, with improvisation and compromise, and with the duplication of certain classes we have managed without serious difficulty. A new medical school is due to open in 1981, when we shall begin to take 200 students a year, though it remains to be seen whether this building will be started on time. Like other universities, we have had to accept the freezing of many vacant posts, but as a result of increasing our student intake we have received limited additional funds that have offset the worst effects of the freeze and have allowed us to establish a few new and vital teaching posts in our preclinical and laboratory medicine departments. We hope to begin a similar process in the clinical departments in 1977-9.

Selecting students

In 1973-4 we received 3078 applications for places in our second year through the Universities' Central Council on Admissions (UCCA), and in 1975-6 there were over 2600 applicants for our 130 places. We retain five places each year in a premedical course for candidates of high academic achievement in arts subjects who have "changed course" after taking A levels or obtaining an honours degree in humanities. These students are taught physics, chemistry, and biology in the faculty of science. For entry direct into the second year we require three A level passes at Grade B or better, one of which must be in chemistry. We no longer demand physics and biology at A level, provided these subjects and mathematics have been passed at ordinary level, though most candidates continue to offer chemistry, physics, and biology. Many now offer A level mathematics.

All UCCA applications are assessed and graded by a panel of selectors. Candidates whose academic attainment at O level is uniformly outstanding and who seem from the sponsoring report to have the right personal qualities for medicine are offered places without interview. For several years up to 1971 we had largely discarded the interview as a method of selection because of studies which suggested that it was an unsatisfactory and unreliable discriminator. Within the last four years, however, we have begun to use the interview more often as a means of choosing between many equally well-qualified and apparently well-motivated candidates. We now interview many of those with a discrepancy between their previous academic attainment and the predicted levels of achievement given in the headmaster's report. We also interview mature candidates, graduates, and available overseas candidates who are being seriously considered. The only overseas candidates we normally accept are those from developing countries that do not have their own medical schools or those who are prevented from studying medicine in their own countries because of political, racial, or other discrimination.

Medical schools are widely criticised for rejecting so many applicants of outstanding personality and dedication who seem eminently suitable for the profession but whose examination results are less than our normal minimum academic standard. But the demands of the medical curriculum are now such that no one who is not capable of achieving an upper second class honours degree in science is likely to succeed in the course. Secondly, we have so many applicants that we can select those who not only have suitable personalities but can also achieve the academic standard that we require. Repeated investigations over the last 10 to 12 years in Newcastle have shown that A-level performance correlates better with achievement in the medical curriculum (judged by examination performance, continuous assessment in clinical appointments, etc) than with any other criteria—for example, O-level performance and interview.

One must, of course, recognise that within medicine there are many diverse careers open to a graduate: we need laboratory-based medical research workers, teachers, and medical administrators as well as hospital-based specialists and general practitioners. Thus there is room for people with many differing personality traits; but we believe that our interviewing panels sometimes help us to reject applications from highly intelligent psychopaths. Perhaps we may also occasionally reject a potential future winner of the Nobel prize. Nevertheless, all but one of our eight selectors share my view that when so many well-qualified young men and women present themselves the interview helps us to select from those of equal academic

merit the ones most worthy of acceptance. We firmly believe that this procedure is now as fair as we can possibly make it, and to those who say that outstanding academic performance may not be necessary in a future general practitioner, I point out that many of our best graduates, in every sense, now choose a career in family medicine.

Like every dean I receive week by week, particularly in the autumn, many letters from men and women, aged from 18 to 40, who express their absolute determination to embark on a medical training. Many have totally inappropriate educational backgrounds, and many others have failed to achieve the necessary minimum academic standard. It is always difficult to handle these inquiries with sympathy and tact yet firmness. We will always look again at an applicant who fails to achieve the necessary A-level standard at the first attempt, but we normally require a higher than minimum level of achievement at a second attempt. Many disappointed candidates embark on degree courses in biological science in our own and other universities hoping to transfer later to medicine. We do not accept such transfers other than in the most exceptional circumstances. No student should be encouraged to believe that by coming to the university to read for an honours degree in physiology or biochemistry (for instance) he can gain entry to the medical course by the "back door." If, at the end of a three-year course, however, he achieves an upper second class degree, is still determined to do medicine, and can face not only the additional years of study but also the financial implications, we are always prepared to consider his application sympathetically.

The Newcastle curriculum : 1962 style

When the Newcastle curriculum was extensively restructured in 1962 both staff and students thought that it was considerably better than the traditional curriculum that it replaced. For the first time the objectives and guiding principles of the course were defined (Appendix 1*).

The aim of the 1962 curriculum was to break down as far as possible barriers between preclinical and clinical teaching and between individual subjects. Thus structure and function were not taught as separate disciplines but as an integrated whole, and teaching was based on the systems of the body. The curriculum was divided into four stages, each controlled by a stage committee, which in turn reported to the curriculum committee, a subcommittee of the board of the faculty.

Stage I—The first four terms were occupied mainly with teaching structure and function (anatomy and physiology) but also included instruction in human behaviour and development and biometrics.

Stage II—In the next two terms the principles of pathology, microbiology, and pharmacology were taught.

Throughout the first two years elective clinical demonstrations were provided jointly by clinical and preclinical teachers of the scientific disciplines that were being taught.

Stage III marked the start of more-formal clinical teaching at the beginning of the third year. This stage lasted two years and consisted of rotating clinical appointments held in the mornings: 10 weeks of general medicine, 10 of general surgery, five in family and community medicine, 10 in paediatrics, and seven weeks each in psychiatry and gynaecology. In the afternoons courses of integrated instruction, which included anatomy and physiology, pathology, microbiology, and more detailed information on the clinical effects and management of disease of systems, replaced most formal lectures. A few lectures in anaesthesia, community and environmental medicine, pharmacy, and toxicology were retained. The 17 system courses were virtually all taught interdepartmentally. Wednesdays were free and could be used for private study or research projects, of which a wide variety were offered by both preclinical and clinical staff. Each year 30 to 40 students embarked on such project-based options in collaboration with members of staff. In the summer term of the second year of this stage (July to September) each student could undertake whole-time study of an approved topic of his choice. Many students have travelled to the USA, Europe, Africa, or to countries as far afield as Fiji during this elective period, while others chose to work in selected hospitals or laboratories in the UK.

Intercalated year—Up to eight of our best students could take an additional year of study leading to an honours degree in science. Several students elected to do either anatomy or physiology, but these options were supplanted by a course leading to the honours degree of bachelor of medical science, which could be taken between stages II and III, half-way through stage III, or between stages III and IV. This course included an intensive period of training for up

*Copies of Appendices 1 and 2 are available on request from the author.

to three months in various aspects of scientific method followed by nine months of full-time supervised research leading to the presentation of a thesis and an oral examination.

Stage IV occupied the final year. All systematic instruction had been completed, so no further formal lectures were given except for a few in forensic medicine, but optional clinical lectures or clinicopathological demonstrations for all senior students continued throughout the year. Students (no more than two at a time) were attached to appropriate clinical departments in hospitals throughout the region. They worked as assistant house officers and undertook ward procedures under the supervision of graduate staff. Many were resident in the hospitals to which they were attached. This stage included eight weeks in general medicine, four weeks in special medicine (geriatrics, cardiology, neurology, dermatology), eight weeks in general surgery, four weeks in special surgery (ear, nose, and throat surgery, and anaesthesia), eight weeks in obstetrics, four weeks in paediatrics, and four weeks in psychiatry. There was also a further four-week elective period and four weeks were spent in supplementing clinical experience in one or other discipline. This stage of the course has been universally popular with students. I believe that the degree of responsibility they have been given makes them much more mature and experienced clinically on graduation than was ever the case before the 1962 curriculum was introduced.

METHODS OF TEACHING AND STUDENT FEEDBACK

Methods of teaching included seminars, clinical demonstrations, discussion groups, and ward teaching, as well as formal lectures, but emphasis throughout was laid on personal clinical and practical experience. Audiovisual aids, especially tape-slide programmes and wall demonstrations, played an increasingly important part. Throughout their course the students were asked to comment on the type of teaching they preferred, the content of specific courses, and even on the performance of individual teachers. There were also staff-student stage discussion groups, and the faculty staff-student committee concentrated on the curriculum in at least one meeting a year. Formal lectures remained popular with the students, so long as there were not too many of them in a single session and they were interspersed with other methods of teaching and well presented.

EXAMINATION AND ASSESSMENT

However careful the selection procedure, there are still a few students who find the transition from school to university difficult and others whose work and study habits are insufficient to cope with the demands of the curriculum. To meet this problem we have a tutorial system. Each student is allocated to a member of the staff, whose responsibility it is to advise the student throughout his course on personal, educational, and other problems. All tutors see their students at least once a term and all are provided with regular information on their performance, in-course assessments, and professional examinations.

We do not think that examinations are superfluous. A combination of continuous assessment and modified formal examinations seems to be the best way of monitoring student performance. The stage I examination after four terms remained a major hurdle, even though a third of the marks were based on continuous assessment of performance in class examinations and tests applied throughout stage I. There were two three-hour papers with questions on anatomy, physiology, and behavioural science, followed by a practical examination and a 30-minute oral examination. At the end of stage II there was a written examination on the principles of pathology, microbiology, clinical biochemistry, and pharmacology, together with biometrics and environmental medicine, again followed by a 20-minute oral examination.

Throughout the two years of stage III each student's clinical performance was continuously assessed on a six-point (A-F) scale and many students submitted voluntarily to simple multiple-choice tests or clinical examinations at the end of each system course. The results of these examinations were used by the clinical subdean and the student's individual tutors for advisory purposes only.

FINAL EXAMINATIONS

The final part I examination took place at the end of stage III and consisted of a three-hour multiple-choice question paper, two

shorter essay papers, and two oral sessions each lasting 15 minutes. The multiple-choice question paper had 60 questions covering all aspects of basic and applied medical science as well as clinical subjects. It was marked by computer, but every question in the essay papers was graded (A-F) independently by two examiners (one internal, one external), and the final grade awarded was the mean. Grades achieved in all sections of the examination were converted into numerical scores (maximum total 100). The grading instructions given to examiners were detailed and precise and avoided the "narrow-band" type of marking (50-60) which so often emerged in the old percentage system.

Recent analyses have shown that the multiple-choice examination paper is an excellent discriminator of student ability, and performance on the essay questions has also discriminated effectively between the best and the weakest students. Significant discrepancies between the two examiners marking the essay questions also proved to have been the exception rather than the rule.

In stage IV continuous assessment played a much more important part. Each clinical supervisor during these full-time attachments provided a detailed assessment of the performance of the individual student on a form which inquired about attendance and interest, knowledge, clinical ability, and general behaviour and then invited an overall assessment on a six-point scale: A=excellent (honours), B=very good, C=good, D=just satisfactory, E=below average, and F=poor. After holding many meetings with the clinical teachers who made these assessments we achieved a reasonably even standard of grading.

At the end of stage IV the final graduating examination (final examination part 2) consisted of a three-hour multiple-choice written paper, where the questions were based essentially on clinical problems. Each had a long and detailed stem describing a specific clinical situation and the question was often accompanied by the detailed results of investigations, including results of biochemical tests, clinical photographs, reproductions of radiographs, or electrocardiograms. The questions covered all the clinical disciplines. The clinical examination consisted of one principal case (medical, surgical, paediatric, psychiatric, or gynaecological); the student was allowed 55 minutes to take a history and examine the patient before being examined for 25 minutes by two or three examiners. There was also a comprehensive 30-minute examination in eliciting and interpreting physical signs, in which the student was invited to examine up to six patients briefly and discuss with the examiners the signs that he had elicited. Finally, there was a 20-minute oral examination with a pair of examiners. Each section was again marked on the same six-point scale (A-F). In the final analysis the multiple-choice question paper accounted for 16% of marks, in-course assessment during stage IV 32%, the principal case 16%, the physical signs examination 24%, and the oral examination 12%. The pass mark was set at the meeting of examiners but has been 50 since the curriculum was introduced.

The student's previous performance in the final part I examination and earlier examinations and the results of any projects or assessments during elective periods of study were taken into account if he was being considered for an honours degree or in the case of borderline pass-fail candidates. Candidates were required only to pass the examination as a whole and the clinical examination as a whole. In 1972 we invited consultants to assess for us on the same six-point scale, in strict confidence, the performance of many of our graduates who were then preregistration house officers. It was reassuring to find that many of those who had been on the borderline of passing or failing and even those who had failed the examination once and passed the second time had performed entirely satisfactorily in their preregistration year.

The Newcastle curriculum: 1976 style

Despite the acknowledged success of the 1962 curriculum the curriculum committee became increasingly aware in the early 1970s that the curriculum had some defects of both concept and content. Teaching was not completely integrated, especially between stages I and II, and the barriers between these stages and stage III still seemed to be too great. Teaching was at times too concentrated with excessive factual content, while self-learning had not been encouraged sufficiently. There also seemed to be too little emphasis on the basic skills of clinical examination as well as inadequate contact with patients during the preclinical stage. Evidence collected from staff and students alike suggested that the social and ethical aspects of medicine had not been emphasised enough. A curriculum review committee was therefore established by the faculty in 1972; it soon became aware

that the committee structure controlling the 1962 curriculum was cumbersome and inflexible; the stage committees seemed to have the effect of perpetuating the divisions between the four stages.

After many meetings the curriculum review committee proposed in early 1975 a much revised curriculum. The general objectives and guiding principles of 1962 (Appendix 1) were accepted without modification but the planning of the new curriculum was based on principles and guidelines given in Appendix 2.*

The curriculum review committee proposed that: (a) the existing premedical year should be retained for five students a year; (b) the first four years of the medical course should be divided into two stages of two years each (stages I and II); (c) stage IV of the 1962 curriculum should continue with only minor modifications as stage III of the new curriculum; (d) the course should be planned by a curriculum committee, which should have the following 18 system and topic sub-committees, which should include representatives from all relevant disciplines and would be responsible for planning the entire course:

Human development, behaviour, and aging (including forensic medicine)	Lungs and respiratory tract
Skin	Female reproductive system
Metabolism, nutrition, and endocrine system	Central nervous system
Skeletal and locomotor system	Mind
Gastrointestinal and biliary tracts	Eyes
Specific infections	Ear, nose, and throat studies
Urinary tract and male reproductive system	Blood and blood-forming organs
Heart and blood vessels	Trauma including burns
	Immunology
	Oncology (including radiation hazards)

COURSE PLANNING AND CONTENT

The new curriculum came into force in October 1976. Its most important feature is the abolition of the barrier between the old stages I and II; the new curriculum has only three stages (apart from the premedical year).

Stage I—The new two-year stage I covers structure, function, behavioural science, community medicine, social medicine, and principles of pathology, microbiology, clinical chemistry, and pharmacology, which are all taught in an integrated manner. From the beginning there are clinical sessions every Wednesday morning, in which students are introduced to patients. On some Wednesdays the students are given clinical teachers to show them the effects of disease in the system that they are currently studying. On other Wednesday mornings students meet in small groups of not more than eight with clinical tutors and are taught the principles of history taking and physical examination—either at first by examining each other or later by being introduced to patients, when these clinical methods are demonstrated to them. On some Fridays throughout stage I students visit families with general practitioners so that they become aware of doctors' social responsibilities and of the organisation of medicine in the community. Individual students are attached to families throughout stage I so that they can take an interest in the social environment of "their" families and of the illnesses from which they suffer. Professional examinations, now being planned in detail, are to be held at the end of the first and second years, the latter covering all disciplines taught in stage I.

Stage II corresponds approximately to stage III of the 1962 curriculum. Much more time is left free for self-instruction, but we are trying to define the objectives of each system course and to indicate to students the core of knowledge which they are expected to acquire; they are to be told how much of this will be presented to them in lectures, seminars, and demonstrations and how much they will have to learn themselves. The morning clinical appointments have been revised slightly to take into account the fact that students should have become reasonably skilled in history taking and examination as a result of the clinical instruction they receive in stage I.

Stage III is virtually unchanged from stage IV of the previous curriculum. The final examination (parts 1 and 2) will probably continue in much the same form as in the 1962 curriculum.

CURRICULAR ORGANISATION AND CONTROL

Unlike the previous curriculum committee, which included all heads of departments, the new committee has only 18 members. These include the dean, the associate dean, the academic subdean,

*Copies of Appendices 1 and 2 are available on request from the author.

the clinical subdean, 10 members of staff appointed by the board of the faculty, and four students nominated by the student body. The 18 system and topic committees, which are answerable to the curriculum committee, plan the teaching from the student's first day to his final examination. Thus there is no significant break in the organisation and planning of teaching between what were traditionally regarded as preclinical and clinical subjects.

It is far too early to tell whether the objectives of the 1976 curriculum are being achieved, but after one term we can at least say that it has proved popular with our undergraduates, though some minor revisions in timetabling will be made in future years. The curriculum committee decided not to invite student feedback by questionnaire at the end of the first term, but the students arranged a questionnaire of their own. The increased amount of free time for private study in stage I was welcomed by 84% of the students; 86% found their family visits well worth while; and 95% were well received by the families to which they were attached. The amount of time spent on practical instruction in anatomy and physiology was thought to be about right, and 96% of students warmly commended the Wednesday morning clinical sessions.

Conclusions

I am fully aware, as are all my colleagues in Newcastle, that change for the sake of change is not an end in itself in medical education. We must continue to assess the importance and results of changes in our programmes of medical education and we must also try to clarify the objectives underlying such change. Although the new curriculum makes heavy demands on teaching time, my colleagues and I believe that it will prove more effective than the one it has replaced. We are confident that more integrated teaching is a logical and important development in medical education and that any change which encourages a student to regard himself as part of a medical team and to think rationally and originally is to be accepted as an advance. With our 1962 curriculum we believe that we trained abler doctors with a greater depth of interest, originality of outlook, and flexibility of attitude than in the past; we have confidence that our 1976 version will be even more successful, but this is a question that posterity alone can determine.

I am grateful to my colleagues on the curriculum review committee for all the hard work which they devoted to the revision of our curriculum, and I would like particularly to thank Professor David Shaw, associate dean, Dr John Anderson, academic subdean, Mr Brian Fleming, clinical subdean, and Mr Norman Shott, deputy registrar, for their advice and support and for their helpful comments on the manuscript.

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What is a liver spot?

Liver spots are spider naevi (spider angiomas, or spider telangiectases). Each consists of a small central arteriole, from which radiate small vessels (the legs of the spider). The central feeding vessel may be slightly raised and when compressed the radiating vessels blanch. Spider naevi are seen in at least 75% of patients with cirrhosis and are the hallmark of chronic liver disease. They are usually most prominent on the face, upper chest, and forearms. Rarely spider naevi are seen in chronic hepatitis, and they disappear if liver function returns to normal. They are also seen in pregnancy and occasionally in normal children. Isolated spider naevi occur quite commonly on the adult face and are not associated with liver dysfunction. There has never been much evidence to incriminate increased oestrogen levels as causing spider naevi in liver disease. They may occur from unmasking of a latent functional defect in cutaneous arteriovenous shunts, but the substance responsible for this is unknown.