Middle Articles

MEDICAL EDUCATION

Shape for a New Clinical School

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In the last few years there has been much discussion of the aims and form of medical education in this country. The role of the pre-registration period has been clarified and there is a wide recognition of the essential importance of post-graduate training and of continuing education. The content of the undergraduate curriculum has been reconsidered; many changes have already been brought about and more are expected. In particular there has been the suggestion of an initial phase of preclinical education, that is, a B.Sc. in basic medical sciences or human biology, followed by an intensive two- or two-and-a-half-year course in a clinical school. Plans for new medical schools at Nottingham,¹ and Auckland, New Zealand,² reflect this approach, as do proposals for new medical schools at Keele,³ Bath,⁴ and elsewhere. To date it is the educational implications of these proposals that have received most attention. The consequences in terms of medical-school organization, of relationships with the hospital service, of the scale of buildings, and of financing have received less attention. It is hoped that this article will stimulate some further discussion of these problems.

It is my impression that thinking about new medical schools is often encased within the tacit concept of a single major institution incorporating within its walls not only all five and a half years of an M.B., B.S. course but also the full structure of postgraduate training, a massive research organization, and a single vast teaching hospital with both general district and special regional functions. This, when built and equipped from scratch, must involve a cost coming up to £20m. It is worth while considering the ways in which a new medical school could develop on a less comprehensive basis, making readier and more economical use of resources that already exist.

Whatever the exact shape of a B.Sc. curriculum (whether it be a B.Sc. in medical sciences reserved solely for intending doctors or whether it be a human biology course that would equally encompass students with different career intention, or some combination of these with separate streams at the end of the first or second years) it is essential to locate this initial phrase firmly within the body of the university. An undergraduate school of medical sciences and human biology should be as much a part of the university as the sciences or arts faculties. Its buildings therefore must be on the main university campus, its full-time staff be members of the academic body, and its students be enrolled as all other degree students. It is the form of the clinical school that raises special questions.

Decentralization

There can be little doubt about the ideal conditions needed to set up a new clinical school. It would require a flat open

site of some 100 acres (40 hectares) in the centre of a major city. On one side would be a large and efficient district general hospital with good staff and buildings; on the other would be the campus of a major university willing and able to start a school of medical sciences and human biology. Near by, within walking distance, would be adequate open sites for the building of student residences and plenty of suitable middle-class houses that could be bought by the senior clinical staff so that they might live near at hand. In addition, one might add, there should be unlimited financial resources. But such conditions are not to be found, and compromises have to be made.

The advantages of undertaking everything on a single site can easily be overstated. Sooner or later, with the rapid growth of medicine, the area will become over-congested and future development will be impeded and made more costly by the need to demolish, while still maintaining existing services. The advantage of having all the staff, academic and clinical, in one building, so that they can meet and intellectually inseminate one another, is more dubious than sometimes thought. Once an organization reaches a certain size, and those working within it get busy beyond a certain point, useful chance meetings are greatly reduced. To walk from one end of an enormous building to another is as time-consuming as a car journey between buildings. Senior people acquire time-tables so full that useful meetings can only be arranged by telephone in advance. From the student's point of view the very large organization makes it difficult for him to recognize people and to establish close contact with his teachers. Because human organizations always fractionate until they reach a small enough size for comfortable personal interchange, separate academic departments tend to become increasingly self-contained: the student who has only interdepartmental affiliation tends to be excluded. Some dispersal to produce working units of more compact size has therefore quite real educational advantages. It is indeed a modified form of this argument which has led to the formation of collegiate structures within some of the new universities and which constitutes one of the *raisons d'être* for the university hall of residence.

Size

Existing medical schools and their teaching hospitals are big organizations. It is quite possible to draw the initial plans for a new clinical school on a much smaller scale. Existing medical schools all have a large superstructure of research commitment. While it is in no way suggested that a new school should be without research involvement, it is inevitable, and indeed probably desirable, that for the opening years this is on a relatively small scale. The growth of major research units, such as those sponsored by the M.R.C., is complex and

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can only evolve piecemeal over some years. The problems of starting a new medical school will be manifold, and, during the opening phase at any rate, the newly appointed professorial staff will have to make their main commitment in the organization of teaching in the new school rather than in major research projects.

The traditional teaching hospital also has grown up to include a number of large and costly special units, such as cardiac and neurosurgery. Such units have regional rather than local importance, and their main educational role is in post-graduate rather than undergraduate teaching. Their existence in the area is desirable, and their close relationship to the medical school is to be encouraged. But they do not need to be an integrated part of the teaching hospital itself. An ordinary general hospital, or hospitals, should be able to provide everything that is necessary for the undergraduate.

Pattern of Decentralization

The pattern of buildings and organization for a clinical school should be derived from an educational plan, not vice versa. For the purposes of devising an outline here the plan for a clinical course put forward by Working Party No. IV of the School of Medicine and Human Biology^{5,6} will be followed. The working party suggested a two-year clinical course leading to M.B., B.S. for medical sciences and human biology graduates. The first year would be spent in formal topic teaching, on the Western Reserve/Newcastle model, for half the day, the other half being on attachment, not to a traditional individual clinical firm but to a clinical group run jointly by several members of the consultant and clinical teaching staff, and to which general practitioners, radiologists, and pathologists would also be attached. The second year would be divided into quarterly periods of (i) child health, (ii) obstetrics and gynaecology, (iii) psychiatry and community medicine, and (iv) teaching in the various special clinical departments. The study of social medicine and of trauma would be spread throughout the two-year course.

1. *Central Teaching Block*.—This must be on or beside the university campus, ideally close to that part which contains the school of medical sciences and human biology. Its main feature will be a major multi-disciplinary laboratory wherein the formal topic teaching will be undertaken. An ordinary lecture hall and some seminar/demonstration rooms would also be necessary. The building should house the administrative offices of the school. A junior and senior common-room where tea and coffee could be served would be necessary; it would probably be best not to attempt any formal refectory provision but to use the facilities of the university. Library needs for a clinical school of this kind are different from the standard kind in that there is access to the library of the parent university for much of the scientific and biological requirement. The books and clinical journals needed would for the most part be decentralized in the clinical-group and professorial-unit buildings. In the central building the library would need its offices and facilities for copying documents.

2. *Clinical Group Buildings*.—For a clinical school with an annual entry of 80 students, and with 20 first-year students per group, four such units will be needed. Each must be within the site of a general hospital. In so far as most such hospitals have at present fewer than 500 beds it would probably be best to have one or at the most only two units at each. Each group would have a clinical tutor, who would be responsible for allocating, supervising, and assessing the clinical work of each student. During their clinical-group attachment the students would, broadly speaking, get their clinical experience in two ways. They would do some work in the ordinary out-patient clinics and in the wards of their teachers, and they would have more leisurely discursive teaching on preselected cases which would be seen within the clinical-group building;

appropriate consulting-rooms and space for clinical teaching would be needed. This arrangement would help to minimize impediment to the rapid flow of ordinary clinical work in the hospital. It would be best if all clinical students, and certainly all those in their first year, could be provided with residential study bedrooms as a part of their clinical-group building; the catering could be done from the ordinary hospital kitchens.

3. *Professorial Units*.—From inception there would need to be professorial units in the following disciplines: medicine, surgery, pathology, paediatrics, obstetrics and gynaecology, general practice, and social medicine. Each professor would need to be supported by a senior colleague with, say, a half-time teaching commitment, and a more junior staff member, perhaps of lecturer status and having senior-registrar standing in the hospital. In the case of surgery, medicine, and pathology, which would be particularly concerned with the clinical-group work in the first year, an additional senior colleague would be necessary, as it would be from these that the clinical-group tutors would be selected. In the case of these three subjects it would be sensible to site professorial units immediately against a clinical-group building, the professor concerned then being one of the group's clinical teachers. The professorial units in the other subjects would logically be sited at whichever hospital in the area is carrying the bulk of the work of that specialty; like the clinical-group buildings these would need their own consulting-rooms and clinical-teaching space. The professorial unit in social medicine could be on the central site. It would probably not be necessary to set aside accommodation solely for teaching the "special" subjects (venereology, E.N.T., etc.); they could have access to teaching space in the clinical-group buildings or the central teaching block.

4. *General Practice Teaching*.—This would be based on a special relatively overstaffed teaching practice buttressed by a short period of attachment to selected general practitioners in the region. Such a special teaching practice would require a special health centre. The general-practice professorial unit would probably be sited there too.

Estimates of the accommodation that might be required in these buildings are given in Appendix A. Possible staff requirement is set out in Appendix B, where recurrent costs of the clinical school are estimated. Appendix C is given to illustrate how such a decentralized school might fit into the hospital and university pattern of a given area. The University of Sussex and the Brighton area are chosen as an arbitrary example.

Cost of a New Medical School

University Course

The Robbins Committee⁷ (in its Appendix IV) estimated the capital cost of a student place in science or medical subjects at £2,640 (1962–3 prices), and for a school of medical sciences and human biology with an annual entry of 110—that is, 330 places—this would amount to £871,200; in round figures at today's prices, say £1,000,000. The Committee estimated recurrent teaching and research costs for medical subjects (excluding costs incurred in the teaching hospital) at £983 per annum; in round figures, say, £3,000 for each B.Sc. graduate.

Both in terms of capital outlay and in recurrent costs these are large sums. But the point to note is that these are *not* costs specifically incurred in medical education; they are general university costs. All the successful applicants for the course would have the appropriate qualifications for admission, and would therefore have to be accommodated in the university system within the Robbins targets in any event. The decisions to be made are not decisions on *whether* to spend the money but on *how* and *where* to spend it. As things stand there is a large unsatisfied demand on the part of student applicants for places

in medicine and studies that could lead to medicine, whereas it is already proving difficult in some institutions to fill the ordinary science places available.

Costs to the Hospital Service

It is hard to make any close estimate of the costs to the hospital service following the initiation of a decentralized medical school of this kind. It has been calculated⁸ that the extra costs of a teaching hospital work out at some £1,800 per undergraduate place. This figure is obtained by taking the overall costs of the teaching hospital and subtracting the costs of comparable non-teaching hospitals. A decentralized clinical school of the sort projected here would not carry the research and special services superstructure of the older teaching hospitals, and it seems probable that extra costs incurred by taking on teaching functions could be on an altogether smaller scale in consequence.

In terms of space, over the years, there would undoubtedly be a growing demand for a more generous scale of outpatient and ward provision in those hospitals that were used for teaching. But the clinical-group and professorial-unit buildings projects in this scheme would themselves provide a good deal of the accommodation needed for the planned discursive teaching in the two-year clinical course. There is indeed a lot to be said for resisting, so far as is practicable, the tendency to develop these hospitals into special over-endowed institutions; there may well be positive advantages in retaining their character as ordinary district general hospitals.

In terms of professional staff salaries there should not need to be any great increase. Consultants and senior registrars taking major teaching responsibilities would of course be paid for the appropriate sessions from the medical school budget. The clinical professors would be paid whole-time by the medical school and would have honorary contracts with the hospitals; in this sense there would be a net gain of senior time which would go some way to counterbalance the inevitable extra demand on other medical and ancillary staff that the presence of students would involve.

The costs of an increased number of pre-registration house-officer appointments, and the vocational training these imply in the region as a whole, cannot really be estimated at all. This is part and parcel of junior hospital staffing costs, and can be seen only as a necessary part of ongoing N.H.S. expenditure.

Costs of the Clinical School

The costs of the two years in the clinical school are set out in Appendix B. For an annual entry of 80 the initial cost is about £½m., excluding site costs. This represents a figure of £3,125 per student place, but this includes a figure of £800 for residential accommodation. The recurrent costs, as estimated, work out at about £1,100 per student per year. This is a bit larger than the teaching costs in the B.Sc. stage, but clinical teaching is necessarily expensive, particularly in terms of academic staff salaries.

In round figures the total current cost of educating a student to M.B., B.S. on this basis is some £3,000 in the B.Sc. and £2,200 in the clinical stage, a total of £5,200. There are bound to be substantial inaccuracies in estimates of this kind, but even allowing for these it seems clear that the cost of producing a doctor from such a school could be substantially less than the figure of £10,000 in the established system that has been quoted in the past.⁸

It is hoped that this article demonstrates the possibility of establishing a type of decentralized clinical school, using existing hospital resources, that could be rapid, efficient, and economical.

Appendix A. Accommodation Requirements for Clinical School (Annual Entry of 80)

	sq. ft.
1. Central Teaching and Administrative Block	
Multi-disciplinary topic teaching laboratory, prep. rooms, storage, etc., at 75 sq. ft. each student	6,000
Lecture hall for 200	2,000
Seminar/demonstration rooms	1,000
Circulation space, etc.	1,000
Senior and junior common-rooms	2,500
Central library, office, and document-copying, etc.	1,000
Central offices	2,500
	16,000
2. Clinical Unit Buildings	
Central seminar/teaching/common-room	1,000
Reading-room	200
Clinical tutor and secretary office	300
Three consulting-rooms for teaching, changing cubicles, and small waiting-room	1,000
Kitchenette-servery; domestic attendant, W.C.s, etc.	500
Residence at 100 sq. ft. per student	4,000
	7,000
Four-unit total	28,000
3. Professorial Units (8)	
Professor's office, personal laboratory, and secretary	600
Clinical staff office	200
Plus (a) Consulting-rooms and clinical-teaching space (obstetrics and gynaecology, paediatrics, psychiatry)	1,000
or (b) Teaching space (social medicine, general practice)	400
or (c) Medicine, surgery, pathology, use teaching-space in appropriate clinical group building	Nil extra
Three of (a)	1,800
Two of (b)	1,200
Three of (c)	800
Total say	10,000
4. Special teaching practice	3,000
Total area	57,000
100 sq. ft. = 9.29 sq. m.	

Appendix B. Costs of the Clinical School (160 places)

1. Capital.—The normal U.G.C. building allowance is £5 per sq. ft. Taking a figure of £8 to allow for fittings, equipment, furniture, etc., the initial capital cost would be £456,000, say £500,000, to include initial library costs, etc. This includes full residence, but only at £800 per head—less than half the normal university hall of residence cost; it is thought that such a lesser scale can be justified, but the arguments are too complex for presentation here.

2. Recurrent.

Academic Staff:

8 professors (at £5,000)	£40,000
10 half-time senior teachers (at £2,200)	£22,000
10 half-time junior teachers (at £1,000)	£10,000
Sundry teaching sessions, say	£3,500
	£75,500

Non-Academic Staff:

Dean: secretary/registrars	£9,000
Accountant: part-time librarian	£3,000
Clinical-group secretaries	£4,000
Professors' secretaries and technicians	£20,000
Other secretaries	£4,000
Technicians, telephonists, porters, etc.	£10,000
	£50,000

Other costs:

Cleaning, maintenance, heating at 12s. 6d. sq. ft., but excluding residential quarters	£25,000
Teaching materials, library, etc.	£3,500
Research costs (not borne by M.R.C., etc.)	£8,000
Office, printing, telephone, etc.	£10,000
Rates at £25 per student	£4,000
	£50,500

Total £176,000 = £1,100 per student per annum.

This figure for teaching costs is based on the working party's view that, "whilst an intensive clinical-science course demands a highly organized framework of teaching, programmed, time-tabled, and paid . . ." a very large part of the clinical teaching must take place in a way that is "informal, spontaneous, voluntary, and honorary."

Appendix C. An Example

It sometimes makes for greater clarity in outlining a plan to exemplify how it might work out in given circumstances. As an illustration a possible development in the Brighton area is outlined. It should be said that this is based purely on my personal knowledge of the area, and on the information in the hospital 10-year plan, etc. It has not been discussed with members of the university nor with representatives of the medical profession there; these suggestions should in no way be taken as having any local approval.

The University of Sussex is well established, of high standing, and growing rapidly. It has a School of Biological Sciences which already has a staff interested in many of the areas that will be relevant to human biology and basic medical science. Expansion to encompass a school of medical sciences and human biology should not raise any obvious difficulties of principle. The university is at Falmer, in rural surroundings some four miles (6.4 km.) from the centre of Brighton. Adjoining the campus is Stanmer Park and some agricultural land owned by the local authority, which has, it is understood, been mooted as a possible site for the later development of a new district general hospital. The population in the locality is some 350,000, and the wider area which might come under the influence of the medical school covers perhaps three-quarters of a million. The hospital and community medical services are of high standard, and there is already a keen desire to develop a medical school.

The central teaching and administrative building, and the Department of Social Medicine, should obviously be placed either on the campus site at Falmer or immediately adjoining it. If at a later date a general hospital were to be developed there it would clearly be nothing but an advantage.

In the south-west part of Brighton, between two and four miles (3.2 and 6.4 km.) from the university, are three hospitals: (1) Bevendean Hospital, which used to be a tuberculosis sanatorium and is now used for chest cases of all kinds and for general work of less acute character; it has substantial grounds which would readily permit some new building, but the hospital buildings are somewhat old-fashioned and there are no outpatient facilities. (2) A mile further on is Brighton General Hospital, a regional district general hospital of high standard on a good-sized site with full outpatient facilities; it also contains a new postgraduate medical institute. (3) A mile further on, near the coast, is the Royal Sussex County Hospital, which, though of high standing, is housed in rather old buildings and on a very restricted site; the amount of space that could be available for the erection of teaching accommodation would be limited.

It would not be difficult to build two clinical group buildings on the site of the Brighton General Hospital, and perhaps one each

at the Royal Sussex County and at Bevendean. If it proved there was not room for one at the Royal Sussex County, two units might be accommodated at Bevendean, but the hospital might then require some development in its outpatient and special facilities, though the students would necessarily have access to these at the other two hospitals. Until the long-term future of Bevendean is settled pre-fabricated buildings would be ideal there. The medical, surgical, and pathological professorial units could be placed alongside those clinical-group buildings that seemed most appropriate.

The paediatrics in the area is based on the Royal Alexandra Hospital in the centre of the city. The paediatric professorial unit would logically be sited there; space is limited, the purchase and conversion of a neighbouring house might be necessary.

The obstetrics in the area is at present somewhat dispersed, but is shortly to be concentrated at the Brighton General Hospital: this, therefore, is the obvious choice for siting the professorial unit in obstetrics and gynaecology. The old Sussex Maternity Hospital in the centre of the city might be suitable for conversion to the special teaching practice health centre and the professorial unit in general practice; this would depend in part upon the characteristics of the surrounding population. If it is unsuitable some other site would have to be found.

The psychiatric work is at present shared between a day hospital in Hove, an outpatient department and some acute beds at the Royal Sussex County Hospital, and a large mental hospital at Haywards Heath some 10 miles (16 km.) inland. The best site for a professorial unit in psychiatry would need careful assessment. If a close teaching-hospital complex was established in this one area of Brighton, with regular interhospital transport arrangements, there might be a case for an entirely new psychiatric in-patient and outpatient development at Bevendean.

Later expansion in size of the medical school would involve the opening of clinical-group units in other district hospitals in the southern part of the county, and, of course, expansion in the clinical professorial units.

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- ⁴ Memorandum on Medical Education—A Submission to the Royal Commission on Medical Education, Proposed University of Bath. 1965.
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- ⁶ ——— Report No. 2, *ibid.*, 1965, 2, 1112.
- ⁷ Committee on Higher Education (Robbins Committee), Appendix Four. 1963. H.M.S.O., London.
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CONFERENCES AND MEETINGS

Changing Face of Cystic Fibrosis

[FROM A SPECIAL CORRESPONDENT]

Opening the Fourth International Conference on Cystic Fibrosis of the Pancreas held at Berne and Grindelwald, Professor GUIDO FANCONI (Zurich) showed how understanding of the disease had led to improved prognosis in the 30 years since it was first described. Until 1936 most children died of respiratory infection in the first year of life without any more definite diagnosis being made. The few less severely affected patients survived longer, and were usually diagnosed as suffering from disease of the digestive tract or from bronchiectasis. By contrast, many treated cases now lived into adult life. Professor Fanconi continued by saying that during the 1940s the connexion between pancreatic cystic fibrosis and bronchial infection had been established by the discovery of abnormal

mucus of high viscosity at both sites, and the term mucoviscidosis had been introduced. The first descriptions of sweat and salivary gland involvement had appeared in 1953–4, when abnormally high concentrations of salt in serous secretions were first demonstrated.

Genetic Studies

Dr. C. O. CARTER (Institute of Child Health, London) described the pattern of inheritance, which was caused by a recessive gene present in about one person in 50. Hence the incidence of cystic fibrosis was about one in every 2,500 live births, though this varied from one community to another. The risk to siblings of patients with the

disease was 1 in 4, while the risk to the children of a patient was the same as the frequency of the gene, being roughly 1 in 50. Professor PAUL DI SANT'AGNESE (Bethesda, Maryland, U.S.A.) reported 13 pregnancies in 10 women with cystic fibrosis, which had resulted in 11 living children free of the disease.

Dr. CHARLOTTE ANDERSON (Melbourne, Australia), discussing the possible mechanisms by which abnormal genes might cause cystic fibrosis, said that the most likely biochemical anomaly was an amino-acid substitution in one peptide of an enzyme molecule; this would then adversely affect only those tissues in which it was normally active. Professor DI SANT'AGNESE postulated that there was a genetically determined cell-