Papers and Originals**PATIENT CARE IN THE AGE OF SCIENCE***

BY

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Although progress in therapeutics was by present standards slow, matters were advancing so rapidly by the time of the first world war that in 1918, on the retirement of Sir Thomas Fraser from the chair of materia medica, it was decided that the increasing amount of research in pharmacology rendered it impossible for the director of the department to continue to be a physician in the Royal Infirmary of Edinburgh.

Hence a new chair of therapeutics named after the great Sir Robert Christison, a former physician and professor of materia medica, was established in 1919. To it there was appointed Jonathan Meakins, who later returned to his alma mater, McGill University, as Professor and Director of the Department of Medicine. It is of particular interest to me that in the *British Medical Journal* of that year there is an article by Sir William Osler on the "Severe Anaemias of Pregnancy and the Post-Partum State," one form of which could lead to a most tragic fatality before folic acid was introduced as a therapeutic agent in 1945. How puzzled we all were by megaloblastic anaemia of pregnancy when I was a house-physician. How much we dreaded it, and hoped that the mother would be carried through childbirth by blood transfusion. But now all is changed. One or two small yellow vitamin pills, the product of intensive research by a drug company, given daily for a few weeks, is usually sufficient to enable the patient to recover to relish to the full the joys of motherhood. In the *British Medical Journal* of 1919, too, Sir Humphry Rolleston gives the death rate from cerebrospinal fever as from 20% to 90%, and there is reference to the disappointing results obtained from the tuberculin treatment of tuberculosis.

As recently as 1924, when David Murray Lyon was appointed to the Chair of Therapeutics, the duration of life of a tuberculous patient after first dismissal from a sanatorium was said to be three years (Elliot, 1924). Pernicious anaemia was a fatal disease thought to be akin to cancer, and the suggested methods of treatment included the administration of arsenic or hydrochloric acid or removal of the spleen (Houston, 1924).

In 1936, the year when Derrick Dunlop was appointed to the chair, there was published a Medical Research Council report (Bentley, 1936) on 677 patients treated for pulmonary tuberculosis by artificial pneumothorax. In the cases where collapse was complete the mortality rate was 34% in three years, but in the larger proportion of patients in whom it was incomplete the rate was 50%. However, this was an important year, for in it the first sulphonamide, "prontosil," was used in puerperal infection due to the haemolytic streptococcus and the mortality rate reduced from 23% to 4.7%. A therapeutic revolution had begun.

Now what we read about pulmonary tuberculosis (Davidson, 1962) is: "Provided the tubercle bacilli are

not entirely drug-resistant and chemotherapy is used correctly, a fatal outcome is indeed extremely uncommon, even if the disease has reached a fairly advanced stage when it is first recognized."

This, then, is our present position in therapeutic time. The rate of progress has suddenly accelerated tremendously. Much remains to be discovered. Endless problems still face us. The battle with disease continues. But these are exciting days in which to study medicine. This is the age of sputniks and steroids—of Appleton layers and artificial kidneys—of telstars and tetracyclines.

Selection of Medical Students

The medical profession is one that can well attract the brightest and keenest of our younger generation, but the competition from pure and applied sciences is great, and industry offers high financial rewards. Nevertheless there are many applicants for each available place in medicine, and selection is difficult. The problems are particularly great in Scottish universities at present because of the changing policies in our schools as regards examination certificates and the discrepancies not only between Scotland and England but also between the schemes that are in operation in individual Scottish schools. For instance, Scottish school certificates are not generally accepted by English universities, whereas the G.C.E. at the A level is accepted by Scottish ones. As yet we have no A-level examinations. Then, again, some Scottish schools allow their pupils to take O levels of the Scottish Certificate of Education in addition to higher-grade subjects, while others do not; some allow presentation for five or more subjects at the higher level, while others restrict the number to four, thereby to my mind giving the restrictions of the English type of school education without insisting on the depth of knowledge necessary for A-level examinations. It seems that the Scottish schools are being forced into the English system of early specialization at the very time when many of the most experienced of English headmasters are expressing doubt and concern about such a system of education.

What qualities do we want in our medical students? Is it sufficient to have the brightest possible pupils? Are examination results all that matter? Is there any danger of Medicine becoming a pure science?

In the handbook of Yale University there is this sentence: "The successful study and practice of medicine requires many attributes, among them integrity, intelligence, common sense, scientific skill, personal stability, dedication to the ideal of service, and the ability to inspire and maintain confidence."

First comes integrity, for without it all is lost. The transatlantic author of this list of necessary qualities makes it plain that humanity is an essential attribute of the successful medical practitioner. When humanity is lost, Medicine is not a noble career. It is true that Medicine is a science, but it is a science in which the

*Abridged version of the Inaugural Address as Professor of Therapeutics given by Dr. Girdwood on October 25, 1962.

expert is dealing not with things but with people. The academic physician of to-day has much in common with the physicist, the chemist, and the biologist. At the same time he remains irrevocably linked to the priest, the psychiatrist, and the social worker. In the writings of Hippocrates is the sentence "ἦν γὰρ παρῇ φιλο-ανθρωπία, πάρεστι καὶ φιλοτεχνία" philanthropy and philotechnia—love towards mankind and towards science. These devotions are not mutually exclusive.

At the graduation ceremony in Edinburgh the graduand in medicine stands and affirms this declaration: "Whereas the distinction of a degree in medicine is now to be conferred upon me, I solemnly promise before God, the Searcher of hearts, that I will to my latest breath abide steadfast in all due loyalty to the University of Edinburgh. Further that I will practise the art of medicine with care, with purity of conduct and with uprightness, and so far as in me lies, will faithfully attend to everything conducive to the welfare of the sick. Lastly, that, whatever things seen or heard in the course of medical practice ought not to be spoken of, I will not, save for weighty reasons, divulge. This I promise as I hope for the gracious blessing of Heaven."

The doctor must be a man of integrity who earns the respect of his patients by his obvious desire to help them. The standard of medical care in this country is on the whole good, and this is particularly so in Scotland, where competition is keen and a negligent doctor is not likely to succeed. May it long remain that way. If the graduate remembers the declaration that he made when he was capped, we need not fear for the future. The prestige of the medical practitioner will remain high amongst the public at large, and the National Health Service will be a model for the people of other countries to envy.

It is, however, up to those of us who are guiding medical students through a curriculum that is becoming more and more scientific and complex to ensure that they are imbued throughout their undergraduate career with this fundamental and basic idea that the role of the doctor in the community is to heal the sick, and that all other considerations, no matter how important, are secondary to this. It is to my mind one of the faults of our teaching programme that it is not until the end of the third year of the medical course that any real suggestion is made that Medicine is something more than a pure science. To a certain extent the art of Medicine lies in knowing when and how to apply the science of Medicine.

Research Activities

I have stressed the importance of the clinical approach and of remembering that the medical graduate has a pastoral role to fulfil, but, of course, the medical student must also be trained as a scientist. The universities, the medical research units, and the drug firms must continue their investigative work and add to our knowledge concerning diagnosis and treatment. The drug companies are, to a certain extent, under a cloud in the minds of the public to-day because of the thalidomide disaster, and this is understandable. Unfortunately, new drugs may from time to time produce completely new side-effects that cannot be foreseen from the tests that have been employed until then. The medical profession and the manufacturers have a high sense of responsibility, and a committee set up by the Medical Research Council is to study how the methods for investigating

the toxicity of drugs can be improved. Neither the manufacturers nor the medical profession can organize large-scale trials of all new drugs on humans or would wish to, and it has to be remembered that for every drug marketed about 3,000 are tested by the manufacturers. One British company has marketed no new drug in recent years despite the expenditure of half a million pounds annually on research and the employment of some 130 graduates and 70 technicians on its staff. This is a dilemma to which we have no real solution.

Therapeutic agents must be developed, and if they are very similar in structure to those already in use and have no unexpected results in adequate trials on bacteria and animals, they can be marketed with almost certain safety. Their effectiveness can normally be judged only by controlled trials. Completely new drugs with a structure quite different from that of therapeutic agents already in use present a particularly difficult problem. Frequently there are volunteers amongst research workers who will test these substances on themselves, but this proves little, and if an otherwise valuable therapeutic agent causes aplastic anaemia in 0.005% of the patients receiving it this will become obvious only with the passage of time.

The drug firms are under fire, but there is much to be said to their credit. How barren would be our pharmacopoeia if the commercial firms had not been progressive in past years, and how limited would be the outlook for therapeutic advances if they all suddenly announced that they were to cease further research themselves and could no longer give assistance to workers in scientific institutions. It should be realized that drug companies give help in other ways. For example, no other medical school in the country undertakes the instruction of so many postgraduates as Edinburgh, and one matter that has always caused me concern has been the lack of amenities for the 900 such students who attend our courses each year. The majority of them come from overseas and must have a very distorted and jaundiced view of the country as they work away in their lodgings, out of touch with each other except when they meet at classes or examinations, and with nowhere to congregate when they desire to relax. It is thanks to a drug firm that this matter is being remedied by the building at the cost of a quarter of a million pounds of a foundation where the medical postgraduates may meet, study, make friendships, and enjoy recreation. This is a gift, with no strings attached, for which we are all very grateful.

Role of Clinical Departments in Research

It is not sufficient for a department of therapeutics to limit its research activities to therapeutic trials. The reputation of a medical school largely depends upon the investigative work that is carried out within its walls or under its direction, and the reputation of a clinical department depends upon its fundamental research publications at least as much as upon the soundness of its teaching of undergraduate and postgraduate students. The first necessity is that the staff of such a department should consist of a group of people with initiative and ideas, working together as a team on some problems, but with individuals free to follow their own pathways where ideas are particularly good or if the worker has special skill or experience. The bright young men must be encouraged and must not have to move elsewhere permanently in order to develop his investi-

gative abilities. Many of the better students take a Bachelor of Science degree before they graduate in medicine, and it is hoped that further encouragement in this direction will be given by the establishment of a Bachelor of Medical Science qualification in the near future.

Another very valuable stimulus has come from the award to a number of students of university vacation scholarships for undergraduate research. The period of the vacation is relatively short, but awards of this nature, while occasionally enabling a student to be the author of a paper, more commonly do a useful service by giving some idea to him and to his teachers of whether or not a career in research would be satisfying and satisfactory. I do not suggest that all our best students should become research workers, and I would again stress the importance to most clinical research workers of maintaining interest in the patient as a person. Amongst medical graduates there are a few excellent research workers who wish to work in clinical departments but are not suited for a truly clinical career, and whose investigations would merely be impeded if they became progressively more thwarted by seeking consultant posts which they are not really suited to hold. It is necessary to allow some flexibility of the university system by permitting them to hold senior lectureships in clinical subjects without having clinical responsibility.

If an academic clinical department has a good research team it requires accommodation, technicians, and apparatus. One of the first acts of a professor on taking over a department must be to determine whether his requirements can be met by the university so far as these basic necessities are concerned. If not, he must devote a great deal of time and energy seeking finance from the teaching hospital, the Medical Research Council, the Scottish Hospital Endowments Research Trust if he is in Scotland, the drug firms, and any other possible sources of money, particularly those that have not yet come to the notice of his colleagues.

Financial Problems

In recent years there has been a great drive to ensure that clinical departments are sited in the teaching hospitals rather than in university buildings elsewhere. The practical advantages of such an arrangement are obvious. The disadvantages are administrative. In England and Wales the teaching hospitals come under boards of governors which are responsible to the Ministry of Health, whereas in Scotland the teaching hospitals are administered by the regional hospital boards through boards of management. Under the Pater formula the costs of building new clinical departments in teaching hospitals in England and Wales may be divided between the boards of governors and the universities, and in Scotland between the regional hospital boards and the universities. In times of plenty these arrangements are satisfactory. In times of economic difficulty such as the present one, however, an arrangement whereby a university department may have to go cap in hand to a board of management that is itself under pressure from a penniless regional hospital board to permit no expansions or improvements is *not* satisfactory. To increase our capacity to treat patients we in university departments have to carry out research. At any time we may need structural alterations in our departments—new electrical fittings, reconstruction of laboratories. The Scottish Regional Hospital Boards

have to consider both teaching and non-teaching hospitals, and are usually particularly concerned with the immediate care of patients.

In the long run the clinical interests of the National Health Service and the universities are the same—to care for the sick. When finance is being allocated and money is tight, however, it is not unnatural that the Health Service administrators may give priority to needs other than research, and then it is clear that the interests of the university and the National Health Service are so different that the present arrangements just do not meet the needs. For more major projects there is an administrative mechanism, but there is no machinery for the immediate settlement of small financial problems in university clinical departments sited in the hospitals, and I suggest that separate financial arrangements should be made for their control.

The lay members of a finance and law committee should not be faced with the difficult problem of deciding whether they should pay for a new potato-peeling machine in the hospital kitchen or make structural alterations in a university departmental laboratory. Equally they should not have to balance a new chimney in a dental hospital against a fume chamber in a university biochemical laboratory, or a new gateway against the furniture for a university department's teaching-room. Unless the present financial arrangements can be improved, it is unwise to put university departments in hospitals unless the advantages clearly outweigh the disadvantages. It is always bad to have to serve two masters, and if they are both approaching penury each may step aside to let his partner have the honour of solving one's pecuniary difficulties.

In addition, there is a need for changes in our negotiating machinery. At present, for instance, the boards of management of our teaching hospitals are not permitted to communicate directly with the faculties of medicine, and the universities cannot negotiate with the Scottish equivalent of the Ministry of Health, the Scottish Home and Health Department. In this age of science we do not want speed in communications to be limited to supersonic airliners and space rockets. We want it to apply also to the various administrative bodies concerned with the care of the patient. In this age of science, too, we want our politicians to realize that our work is being hampered because inadequate funds are being made available to universities and hospitals.

Role of the Medical and Nursing Professions

The search for money, the frustration of having two administrative authorities, and the endless round of committees is what keeps the head of a clinical academic department away from his patients and his laboratories. The scientific background of modern medicine increases in complexity. The apparatus becomes more and more complicated and expensive. The need for technicians steadily increases. The academic physician has to keep up to date as regards new drugs and investigative methods, has to maintain his knowledge of clinical and laboratory advances on a broad front, and has to make significant contributions in his own particular branch of research. The part-time physician also has to keep up to date, and the difference usually is that the clinical commitments outside the teaching hospital prevent him from sharing in the laboratory research. This does not mean that his contribution to medicine as a whole should be disparaged. There is no point in having

advances in knowledge if we do not have competent consultants to make use of them and to share in the teaching of clinical medicine and dissemination of new information to students and general practitioners. Some part-time physicians prefer to do laboratory research work in addition to their other duties, and for them the introduction of so-called "A plus B" posts, part-time university and part-time National Health Service, is a great opportunity.

In this scientific age the hospital nurse has ever-increasing responsibilities. As technical procedures become more complex and as more and more scientific equipment is used, the breadth of her knowledge has to increase. This is desirable, but it must not be at the expense of humane qualities. The introduction into the hospitals of more complicated apparatus does not mean that there should be a change in the fundamental role of the nurse. Her primary duty is to care for and comfort the sick.

I have referred already to financial problems. In the hospital structure it is, of course, obvious that the recent necessary and proper increase of the salaries of nurses will increase the cost of the National Health Service—just as did the earlier increase in the payment to doctors. There are, however, hidden financial problems facing the hospitals. When the nurses' hours of duty are cut, then obviously more nurses are required, but where is the money for their salaries to come from? We are all very proud of the many developments that have taken place recently, such as the renal transplant operations of which you are all aware, but for one transplant nine extra nurses are required, and if the regional hospital board cannot pay for them they have to be taken from other units in the hospital whose medical staff immediately and rightly complain that their work is being impeded. In this scientific age the administrators must take it that progress is impossible if unexpected requests for money are not met, and we cannot remain in the forefront of progress if there is a great delay in the fulfilment of reasonable requests. There is no use attempting to relate the number of nurses required in a hospital to the number of beds. This is a mathematical *non sequitur* because it takes no account of the type of work or of the number of out-patients that are being seen.

The Royal Infirmary has been provided with an up-to-date isolation unit for infected patients requiring treatment with the artificial kidney, but there is not sufficient money to allow the unit to be staffed with nurses.

I have already referred to our overseas medical students, but it should be realized that training is given in Edinburgh to nurses from other lands, and an interesting development in the near future will be the establishment of an International School of Advanced Nursing Education within the Faculty of Arts.

The Hospital of the Future

These, then, are some reflections on the present situation. If we look in the crystal ball what do we see of the future? This is indeed a time of development, expansion, and reorientation. In common with certain other towns throughout the country, we are to have a new hospital—in fact, we are to have two new teaching hospitals, for both the Royal Infirmary and the Western General Hospital are to be replaced. The Royal

Infirmary is to be an 800-bedded hospital occupying its present site. We have a great opportunity before us, but also a great challenge and responsibility. None of us knows how to plan a large teaching hospital, and even the most experienced of architects cannot anticipate just what we want for the teaching hospital of the future.

In planning we have to consider our three main functions, which are patient-care, teaching, and research. Representatives of those who are going to work in the hospitals must at this stage give the architects a schedule showing what is desired in the wards, out-patient departments, academic areas, and other parts of the hospital. Nothing must be overlooked. It has to be decided whether or not the hospital is to be composed largely of specialist units, or whether the wards should be general ones with provision for specialist interests. So far as the Royal Infirmary is concerned, there seems to be a surprising measure of agreement that general wards with special interests are to be preferred in most instances. There can be no doubt that there are advantages in having special units, but for undergraduate teaching there are great advantages in having general wards, and if these are staffed by general physicians with special interests the patient will have all the benefits of specialist knowledge.

The growth of special units in the region in recent years has been a splendid thing, but the Royal Infirmary has suffered by having, as it does, the motto *Patet omnibus* while other units by their very nature must restrict admission to special groups of patients. Indeed some formerly common diseases are not seen in the Royal Infirmary now, not because they no longer exist, but because the patients are in special units elsewhere in the town. It is little wonder that, in the final examinations, students now show evidence of lack of any practical knowledge of large areas of medicine, and freely admit that they have not seen certain common diseases during their medical course. This can, to a certain extent, be put right by the development of general units with special interests and by the expansion in the general hospitals of out-patient clinics for the various branches of medicine.

There seems little doubt that the very large wards are things of the past, and in the new hospital the unit will consist of numbers of beds in small rooms or bays, together with a few single rooms. Recently a few of the medical wards of the present Royal Infirmary have been divided into bays of four or five beds, leading to an untidy-looking arrangement that has not proved popular with many patients and members of staff, but in the hospital of the future the arrangements of the rooms and bays will be much more pleasing.

Adjacent to the ward area in the academic clinical units will be the research area with large general laboratories and smaller ones for special purposes and delicate instruments. It is hoped that any part-time clinicians who wish to do so will work in these laboratories and that they will encourage their registrars and other members of the junior staff to spend time there too. This laboratory area must be large, for we must not stand still, but must plan for the academic medicine of the future.

In the Royal Infirmary there will be the so-called paraclinical university departments of bacteriology, pathology, clinical chemistry, and medical physics, unless there are second thoughts about the difficulties

arising from dual administration. Pharmacology will remain in the area of Teviot Place and George Square, together with anatomy, physiology, and the other preclinical subjects. Meantime the building operations in George Square will be going ahead to give us a fine new university with a campus that will create envy among colleagues in many of our sister institutions.

The operating-theatres will be grouped together, and there will be bed areas for pre- and post-operative care. The polyclinic area will be large and well equipped, and it is believed that it will play an increasingly important part in the teaching programme. This is a town that is popular for society meetings and international congresses, and the most up-to-date lecture theatres must be provided, preferably with screens to allow triple projection of slides to go on simultaneously so that results may be compared, and extending closed-circuit television to allow for projection in colour from operating-theatres and elsewhere. Already it is possible to hear the foetal heart at a distance from transmitters placed on the mother's abdomen. Many of us have been at medical meetings at which we have discussed cases with our colleagues across the Atlantic by transatlantic cable, and it has already proved possible to have an international medical conference with demonstrations of cases and operations in colour bounced back by telstar from countries far away.

In the modern hospital there will no doubt be a central sterile supply department from which all the sterile instruments, utensils, and bottled fluids will be supplied to the theatres and ward areas in packaged forms or as sets and treatment trays. Much of the equipment will be disposable—to be used once only and then thrown away. Indeed, we are already well on the way towards this. In the United States firms of hospital consultants with such practical knowledge of hospital organization help to simplify hospital design by streamlining the non-medical activities. They have introduced pneumatic-tube delivery systems for indents, case-notes and x-ray pictures, and conveyer-belt systems for the distribution of meals and medical equipment to the wards. The central sterile supply department, the pharmacy, kitchen, laundry, linen repair, equipment, maintenance, records, and housekeeping departments are grouped together to make communications easier, so that there is a central supply area for all these activities. There are great advantages in this, and the introduction of a modern system of communications will be essential in the new hospitals.

In some American hospitals the secretaries are grouped together in a central office and the medical staff dictate their letters to a central bank of recording instruments from which the young ladies do their typing in a very-well-organized and efficient way. I am sufficiently old-fashioned to hope that this will not mean the banishment of all secretaries from the ward units in the hospital of the future, since the ward secretary is a receptionist and valuable member of the unit staff rather than a mere instrument for transferring the spoken word on to paper. I do agree, however, that the chaotic situation of each ward unit having individual proformas and case-filing systems must stop and be replaced by a highly efficient central records office with vacuum-tube communications to the wards and out-patient departments. The building of a new hospital without an efficient staff-location system would be unthinkable.

I have referred to the academic areas in the new hospitals and the importance of adequate research facilities. For research purposes, too, an efficient central records office is essential, and it should have communication with a good hospital medical library. I have suggested that certain areas should be in juxtaposition. For example, the departments of medicine and therapeutics in the new Royal Infirmary should be adjacent, or one on top of the other, and certain facilities should be shared. On the other hand, I do not think that the rigid separation of medical and surgical units should continue, and I would hope to see beds that were not designated either medical or surgical into which certain patients requiring joint medical and surgical care might be admitted. This scheme works well at the gastrointestinal unit at the Western General Hospital, and Professor Bruce and I have a similar arrangement in the Royal Infirmary, the chief disadvantage of which is the geographical separation of our departments.

The separation of teaching activities into medicine and surgery is artificial. Already there are joint systematic lectures in these two aspects of patient care, and I hope that the rigid separation of clinical teaching will also break down. It seems that a problem that will face the architects is likely to be the number of departments and units that desire to be adjacent to each other. This, however, gives more promise for the future than if we all desired to be as far away from each other as possible.

The new Royal Infirmary will probably occupy a much smaller ground area than the present one since it will be so much taller, and various other buildings will be in the grounds. It will perhaps be possible to have a building supplying hostel accommodation for post-graduate students. There will be a building to house animals for research purposes, and with this must be suitable facilities for operations.

There is a lot of discussion about private beds in the National Health Service hospitals, something that is lacking in this city. I feel that those who prefer to pay for their treatment should be allowed to do so. There are several private schemes for hospital cover, such as that organized by the Nuffield Foundation, and there might be benefits to all if such Foundations were encouraged to build their own blocks within the hospital grounds.

The Medical Curriculum

We have, then, plans for new hospitals in the city, and the university is largely being rebuilt. What about the medical curriculum? Plans for new curricula are being discussed in medical schools throughout the country, and Edinburgh, too, has fresh plans for the future. We have always been proud of our educational system in Scotland, and of the fact that a university degree was available to the poorest boy if he had talent. For many years the Scottish Universities have exported scores of doctors to the British possessions, the Commonwealth, the Services, and even to England. Our classes have been large and the system of formal lectures has been in our blood. Nevertheless, we do tend to instruct rather than educate, and our curriculum has been inflexible.

Nowadays there is so much in medicine that the teachers cannot cover it all by a series of lectures. We have to give a basic outline, but we must develop the scientific and clinical ability of the student and excite in him a desire to think for himself, to read for him-

self, and to go on learning for the rest of his professional career. The new curriculum will also allow students to have a certain measure of choice of subjects, so that they may follow alternative paths according to their aptitude and desires. The clinics in the wards will be rearranged to be smaller, and it is hoped that students will take a more personal responsibility for their patients, and have laboratories in which to carry out the simpler investigations on them.

Another aim is to break down the barrier that tends to exist between the preclinical subjects on the one hand and the clinical subjects on the other. It would be wrong of me to prejudge a new curriculum that has not yet been put into operation, but I hope that the clinical importance of preclinical subjects will be stressed at an early stage in the course, though I agree with the view that the encouragement of critical habits of thought should be an objective of the teaching in the preclinical period. I am sorry that pharmacology is to be made a preclinical subject and that the happy union of pharmacology and therapeutics in fourth-year teaching has been dissolved. I hope, too, that the departments of pathology and bacteriology, now shown in the new draft programme as doing their teaching in the fourth year, will continue to provide instruction in the general aspects of pathology and bacteriology in the third year. To the clinician it is most important that this should come before the students are given their basic instruction in the examination of the patient, a very important part of the course that will in future be taught in the period that is now the vacation between the third and fourth years. I may add in passing that the problems of pre-clinical teaching are likely to increase in the future if inadequate salaries in preclinical university departments throughout the country continues to lead to an almost complete lack of applicants with medical qualifications for vacant teaching-posts.

The teaching of postgraduate students is as much the concern of the Royal Colleges and Corporations as of the Universities, and the four Scottish Universities have formed a Postgraduate Federation to plan courses and prevent overlapping. The Royal College of Physicians of Edinburgh is going from strength to strength and there are great developments under way in the Royal Faculty of Physicians and Surgeons of Glasgow. It does seem, however, that in this small country that has given so much to Medicine it is wasteful to have what are in effect two powerful Colleges of Physicians carrying out similar functions. When the dust has cleared and the Edinburgh and Glasgow Colleges have completed their current plans for development, I wonder whether the time has not come to re-examine the possibility of uniting to form a Royal College of Physicians of Scotland. Such a College might be in a position to contribute significantly to medical education in the Commonwealth.

Such is unity, and unity is all-important. In universities, medical schools, and colleges there are always problems of personalities and of conflicting aims and ambitions. In many university towns there is rivalry between the members of the university staff and those of their colleagues who are employed under the National Health Service. Let us have the stimulus of friendly rivalry and competition. We have great opportunities. The medical school is at a critical phase of expansion and development. There is so much to be done. Let us not waste our energies by deviating

from the common purpose to indulge in internecine pyrotechnics.

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NOTES ON CARDIAC RESUSCITATION, INCLUDING EXTERNAL CARDIAC MASSAGE

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Beck *et al.* (1956) wrote: "This is the report of a man who died from a heart attack and in whom defibrillation was successfully accomplished. He was dressed in his street clothes when death and resuscitation occurred." Their dramatic account showed the possibility of reviving the victims of cardiac arrest outside the operating-theatre, and was followed by further reports of successful resuscitation by thoracotomy and direct cardiac massage (Reagan *et al.*, 1956; Celio, 1956; Walton, 1960; Straight *et al.*, 1961; Brass and Kendell, 1961). The introduction of external cardiac massage by Kouwenhoven *et al.* (1960) has now given a further impetus to attempts at the rescue of medical patients. In the past two years accounts have appeared which leave no doubt of its efficacy (Gazes and Boone, 1961; Jude *et al.*, 1961a; Nixon, 1961; Thal *et al.*, 1961; Hardy, 1962; Semple and Dall, 1962), while others have also pointed out its complications (Baringer *et al.*, 1961; Morgan, 1961).

Although external cardiac massage may enable an adequate circulation to be maintained during the period of arrest (whether the mechanism is ventricular standstill or fibrillation), a spontaneous return of heart action cannot be relied on, and the adoption of the method requires familiarity with its two chief adjuncts, the external cardiac pacemaker and the external defibrillator. In this field the contribution of Zoll and colleagues has been paramount (Zoll, 1952; Zoll *et al.*, 1955, 1956). The first use of an external pacemaker made in this hospital was reported by Leatham *et al.* (1956), and since then its value has been repeatedly proved, especially in the treatment of Stokes-Adams attacks. External defibrillation, with electrodes applied to the intact chest wall, was used with success in dogs by Hooker *et al.* (1933) and Guyton and Satterfield (1951), and has now become an established clinical practice (Zoll *et al.*, 1956; Kouwenhoven *et al.*, 1957). Our own experience of it is more recent.

We believe that the triad of external massage, external pacing, and external defibrillation (with thoracotomy and direct defibrillation in reserve) will become accepted practice in all hospitals once the necessary apparatus is

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