MEDICAL EDUCATION

Curricular Reforms in Medical Schools

By P.T. Jayawickramarajah*

Basic medical education must provide an adequate foundation for the development of the physician of the future. It should not merely focus on presenting the complete detailed systematic body of knowledge concerning each and every medical and related discipline. Rather it must provide the setting in which the student can learn fundamental principles applicable to the whole body of medical information, establish habits of clinical reasoning and critical judgement and develop the ability to use these principles and judgement in solving problems of health and disease.

The traditional Subject Centred Curriculum cannot cope with the increasing biomedical knowledge. It is no longer possible to accommodate bits and pieces of information accumulated in biomedical Sciences over the years into a basic medical curriculum. In ancient times medical students learned the practice of medicine by being apprenticed to a practicing doctor. Later, with the expansion of specialities, students took part in each discipline to receive instruction. Much of what we find today, in Medical Sciences, are comparatively young disciplines. What was once Anatomy has splintered into normal Anatomy and morbid Pathology. Pathology later gave birth to Physiology which subsequently produced Biochemistry and Pharmacology. Microbiology, which was non-existent a few decades ago, has now fragmented into Parasitology, Mycology, Bacteriology, Virology and Immunology.

*Asst. Professor Medical Education,
College of Medicine & Medical Sciences,
Arabian Gulf University,
State of Bahrain.

The sequence of the medical curriculum which is in practice in the old schools, is thus a result of convenient arbitrary decisions, and is not based upon the needs of training the physician.

In the recent past, planners of medical schools all over the world have become increasingly aware of some outcomes of educational research. The amount of funding for research, in the educational process in medical schools alone, has risen many fold during the past two decades. The World Health Organization has trained medical teachers and supported research programmes in medical education by the establishment of regional and national centres. Today we can see some changes taking place in the educational process in the traditional schools, with a few schools taking up the challenge of innovative models based on rational criteria.

In an analytic study of Curriculum Materials of a standard medical school, it was found that a student of medicine is expected to assimilate five times the number of concepts per hour encountered by their counterparts in Liberal Arts, in addition to acquiring social, laboratory and clinical skills[1].

The fact about information overload is well documented in most published material. Curriculum committees of all the new schools are in a dilemma when identifying the "core" material required for a student of medicine. Most schools have used independent criteria in deciding the content which, in any case, is dependent on the subject matter specialists and their knowledge of the educational process. It is hypothesised that short term memory

processes are transient in relation to time and cortical localisation. Information of long term memory (greater consolidation of information) can be localised to particular cortical circuits similar to speech in the left cerebral hemisphere. Recall and repetition of the experience provide the opportunity for progressive consolidation. Forgetting occurs in the absence of rehearsal of new information. To solve clinical problems one must be able to reason with information. Hence, the teaching of information which is not related to solving problems is probably negatively reinforcing[2].

One of the major side effects of the Flexner Report of 1910, which focused on university based medical education, was the strengthening of departments at the expense of students' programmes. The discomfort with the Subject Centred Curriculum was perceived in the USA as early as 1956 when Case Western Reserve Medical School in Cleveland commenced its integrated curriculum. This was followed by gradual changes in more than 60 medical schools in the USA. In 1967, the General Medical Council of the U.K. recommended flexibility in curriculum planning[3]. This resulted in the evolution of schools with completely new integrated curricula, as in Southampton and Newcastle–Upon–Tyne, in Britain. Even some of the old schools of the University of London have made major departures, as seen in the Clinical Curriculum of Royal Free School of Medicine. This trend was followed by the newer schools in Canada in McMaster and Newfoundland, the University of Newcastle in Australia, and Maustricht in the Netherlands.

In the developing world also, many schools have made changes in the existing curricula with a few schools adopting integrated curricula, as in Tribuwan University, Nepal and Jasira in Sudan. The College of Medicine of the Arabian Gulf University in Bahrain could be considered as an innovative model in the Gulf region. When one analyses the innovative schools, each school is unique in its own respect.

Major factors that determine the curricula include institutional philosophy, changing needs of society, financial resources available, the entering abilities of students, and expertise and commitment of the academic staff. Major changes in the content and process of the basic medical curricula could be identified separately, as no two schools could be considered to be a mirror image of the other.

Any analytic review of the curricula of the new schools show a wide variation in philosophy, content and organisation. Some specific innovative characteristics are seen in varying combinations in individual schools. It is convenient to discuss these items as follows :-

1. **EXPLICIT STATEMENT OF INSTITUTIONAL GOALS**

   All the new schools have specified and documented a list of institutional goals. In practical terms, the educational philosophy of school can be recognised both in the statement of goals and in a review of the methods used to achieve these goals.

   The College of Medicine of AGU, in Bahrain, has specified clear institutional goals for its innovative programme[4]. These statements in all the schools have a general "core" of requisite abilities to be achieved by the student in terms of knowledge, skills and attitudes. However, variation is noticeable in their philosophy and direction. Most of the new schools tend to specify community orientation[5] and a need for the learner to continue his own learning, both during and after graduation.

The documentation of these goals is usually a team effort by a Curriculum Planning Committee. This dictates the direction of the programme and calls for commitment from the teachers and learners.

2. **BEHAVIOURAL OBJECTIVES**

   Tyler[6], a well-known curriculum theorist, presented some fundamental questions which are used to formulate a basic framework for curriculum. The first question deals with the goals and objectives.

   > "What educational purpose should the school seek to attain?"

   There is general agreement that at the very least, general goals should be stated for any educational programme. Such goals should also

provide direction for both learner and instructors. Tyler [7] also stated:

> "For these goals to serve most helpfully in developing a functional curriculum it is necessary to define them clearly in terms of behaviour and content."

There is still continued argument about the specification of behavioural objectives. The practice of stating intended educational outcomes in this form was first advocated by Tyler for the purpose of using statements as standards against which student performance could be judged. In recent years behavioural objectives have been used for medical education.

Miller et al.[8] states :

> "It does matter which way a medical student goes. It matters very much to him, to the faculty and to the community which will ultimately reap the harvest of his learning or his failure to learn. He must move steadily and efficiently toward a goal which is both achievable and clearly defined."

at present there is much evidence from the recent medical literature, that the specification of behavioural objectives make a difference in the learning process. It was shown that student learning is enhanced when behavioural objectives are used in the clinical setting[9, 10].

3. SELF DIRECTED LEARNING

If doctors are to be the life long learners, able to assess changing health care needs, keep up with changing concepts and new information and adapt their own performance accordingly, the skills to do these should be designed and developed during the formative years of medical school training. Much of what is taught in the medical schools may be forgotten, become out of date or be incorrect in the future.

Commenting on Courvoisier's Law relating to gall bladder distension, which is described in all the surgical text books, Watts[11] argues — "The Law is now of little use, yet it is still taught and learnt — why? Is it because the student likes a didactic role, or because his teacher has not brought as much reason to bear on his knowledge as Courvoisier did with what was then available?"

Even during Sir William Oslers' time[12], when students presented their cases, their background reading was not done from simple students texts. He insisted that they should refer to the main body of medical literature. They were expected to go to the Index Catalogue of the Surgeon Generals' Library and then to the original reference sources. It is unfortunate that students of today are not as active in this respect as they seem to have been in Oslers' clinics at the John Hopkins, eighty-five years ago.

4. INTEGRATION OF CURRICULA CONTENT

An integrated curriculum means different things to different people. Terms such as interdisciplinary teaching, correlated teaching, applied teaching, and unified teaching have been used to describe different programmes at varying levels of integration. In all these approaches planners have aimed at providing a body of knowledge, hitherto given in isolated bits and pieces by isolated departments, together as a unified whole.

Research on the teaching and learning process shows that an integrated curriculum facilitates student motivation, learning and retention. The students and their future patients should not be allowed to suffer from a teaching programme which allows for the preservation of the autonomous department, each with its own vested interest. These departments are essentially historical accidents. The traditional sequences are based on arbitrary decisions which do not coincide with the practice of medicine. It is commonly assumed that the normal should be taught before the abnormal; but there is increasing evidence that only by relating to the abnormal can the range of normal become clear to the student.

Different strategies have been adopted to achieve integration. The system oriented approach is used by most of the new schools.

A system oriented approach is the structuring of a curriculum by organ systems which is aimed at having all the skills and knowledge pertaining to that system discussed, at one time. For example, all aspects of the Cardiovascular System could be taught simultaneously including such subjects

as Anatomy, Physiology, Pathology and Pharmacology. Clinical correlations can also be easily demonstrated with suitable examples. This type of teaching would incorporate basic scientists and clinicians who present an integrated, logical, step-by-step approach to medical problems.

5. PROBLEM BASED CURRICULUM

This curriculum is based on an integrated approach to medicine, which represents an alternative to studying blocks of classified knowledge in an organised sequence.

The learning process could be analytically considered to occur at three stages :

I. Acquisition of understanding
II. Retention
III. Transferability to new setting

Acquisition of understanding takes place immediately during the learning activity. Retention of the material learned is a real problem in medical education. Research has shown that the forgetting of isolated facts in Anatomy is no different from that of the forgetting curve obtained with nonsense syllables[13].

Transfer can occur most effectively if what is learned, be it a principle or a motor skill, is rendered meaningful to the learner; that is, that it articulates clearly with what the learner already knows and can be made to fit into his organisation or structure of knowledge. If meaningful learning leads to positive transfer more effectively than rote learning, it follows that the most stable objects of instruction are concepts, principles and general strategies rather than isolated facts. To optimise transfer they must be practised well in a variety of situations. The more closely the learning condition can simulate the actual application setting, the greater the likelihood of success.

The probability of effective transfer increases even more when the learning situation is structured so that the learner is called upon to discover a principle for himself, rather than simply being told in lecture, discussion or text. Problem based learning in medical education integrates all these ideas.

Since problems in medicine are primarily those of individual patients, most problem situations relate to an individual clinical case. In this way health professionals learn in real life. It is also argued that problem solving and clinical reasoning skills can be better achieved by this method.

In most new schools, as in AGU, the learning occurs in small groups of five to six students with a faculty tutor whose principal role is to facilitate the learning process. The tutors are advised not to provide information during the tutorial. This method requires that there are minimal scheduled activities such, as lectures, so that the groups are free to schedule their own activities to meet individual needs. Usually the problems are chosen on the basis of prevalence, their impact on the community, or their importance as a model for related group of problems.

Problem based learning could be given in the curriculum in different ways. Real patients, computerised patient problems, problem boxes and simulations are used to assist this method of learning; even the traditional lecture and discussion methods could be modified to accommodate this approach.

The problem based learning consists of more than simply learning around clinical problems. It is a fundamental intellectual process that can be applied to physiological problems in research laboratories, to problems of family dysfunction and to issues relating to health care in the community[14].

6. EARLY CLINICAL EXPOSURE

Experimentation in this area started as early as 1951 at the University of Buffalo. There is extensive medical literature subsequent to this study, pointing to the advantages of introducing the patient early in the student's medical school career.

The traditional mode of sequential learning and teaching the normal before the abnormal, has been challenged. With regard to problem solving ability, it has been argued that medical students are mature enough and bring a wide variety of expertise to the programme; that they can think logically and that at the very best, they possess an intelligent "lay public" base line of information.

For the medical student, no method of instruction can be more meaningful than direct contact with the patient, along with a great amount of independent study about the patient. This is well recognised by most of the new schools. It is reported in the General Medical Council Survey that more than sixteen schools in the United Kingdom have commenced with early clinical teaching, even in the schools with Subject Centred Curriculum[15].

7. CHANGE IN ORIENTATION OF CONTENT

Basic Sciences :

Currently in the new schools there is a trend toward decreasing instructional hours in basic science teaching. This is based on the following rationale.

— An increase in biomedical information demands a careful scrutiny of the material to be taught in order to accommodate essential new knowledge and to delete aspects which are not immediately relevant to the basic physician.

— Basic science teaching becomes more realistic when it coincides with clinical experience.

— Specialised instruction required in the basic sciences can be carried over to the post graduate and residency programmes.

— Different approach could be used in teaching basic sciences. For example, the validity of the traditional learning of Gross Anatomy, by individual dissection of cadavers, as a basic preparation in training a physician is uncertain.

— When the content is derived from task analysis of the physicians work, much of the information hitherto taught in basic science becomes redundant.

— Even in the old medical schools revising their curricula, the time devoted to basic science instruction has been reduced, especially in Gross Anatomy. In some schools dissection of the cadaver is optional, and in others this experience is given as an elective.

Behavioural Sciences :

Coupled with the reduction of basic science content there is an increasing trend to introduce behavioural sciences in the medical curricula.

— A recent emphasis in the biophysical nature of man's health and disease and the associated tendency for an exclusively scientific approach has led to the neglect of a more humanised education for doctors. Behavioural science teaching can remedy this deficiency by promoting continuing development to the student, as a human being, making him sensitive to human problems and enabling him to deal with sick human beings rather than with organs or diseases only.

— To convey a scientific foundation of human behaviour to the student; i.e., to teach the subject as a basic science and to demonstrate to students that human behaviour is amicable to objective, meaningful investigation through established methods of science.

— Behavioural sciences are now being viewed as basic sciences for clinical phychiatry.

Electives :

With interdisciplinary teaching, increased free time, less didactic lectures, and an increasing variety of learning experiences in most of the new schools, electives are given to encourage the student to determine a part of his medical school course and also to provide a chance for him to select a programme to evaluate possible career choices. Electives are given horizontally in either the first year or in the final year and sometimes vertically throughout the course.

8. USE OF TECHNOLOGY IN TEACHING AND LEARNING

Technology is used in various ways in all new medical schools. Commenting on learning aids Miller[16] writes :

> "More sophisticated, instructional technology such as single concept films, audio casettes, programmed instructional devices and simulations may have greater appeal, but what is important is not the device itself but

how that tool is used. Too often these aids to learning are regarded as "add-ons" mere supplements to the conventional source of wisdom, the "teacher". If a new sense of personal responsibility for individual learning is ever to be achieved by health professions students, these instruments must be integral elements of a flexible and individualised programme, not merely extras to be enjoyed if time permits."

For the individual learner, the availability of films, audio casettes, or computers with diagnostic problems are very useful when compared to the traditional teaching methods. The simulation devices, videotapes and other equipment could be used to substitute for clinical materials that are not available to the learner during an instructional period.

These devices can also be used to help students acquire such skills as learning to do a physical examination before examining a real patient. But it should be realised that no simulation device can replace a real patient in a learning situation.

9. ASSESSMENT OF STUDENT PERFORMANCE

Evaluation is not merely a collection of techniques, it is a continuous process. Research in this area, in medical education, has significantly contributed to the learning process and also the quality control system. Now there is an increasing trend to use examination for learning purposes rather than just for grading. Learning to be a doctor involves progressive acquisition of cognitive, psychomotor and affective elements of competence. The traditional examinations assessed only part of the cognitive aspect of competence; and the grading system based on a normal curve distribution (norm referenced) is of questionable validity. Wingard and Williamson [17], in an extensive search of literature for the period of 1955–1972, found little or no correlation between undergraduate grades and subsequent career performance. This is evidence that the traits evaluated in an educational setting often do not correspond to the traits valued in a professional setting. It has been also shown that the popular, oral examinations, as conducted in the traditional schools, lack reliability and validity[18].

New conceptions of the purpose and process of evaluation seem to hold greater educational promise than conventional schemes. Three of these conceptions are: (a) formative evaluation (b) summative evaluation and (c) self evaluation. In addition different techniques are also being used in evaluation.

Evaluation Techniques :

Evaluation techniques have been refined in most medical schools. The refinements are a consequence of research findings which question the reliability, validity and objectivity of conventional evaluation techniques. Objective examinations have replaced most of the traditional essay and oral examinations. More objective instruments such as checklists and rating scales are used to assess psychomotor and affective areas. Patient management problems, simulations and modified essay questions, are increasingly used. However, the validity of these techniques have not yet been established. No one technique could be considered satisfactory, and a variety of instruments should be used in assessing achievements of specific objectives.

SUMMARY

This review of present trends in Medical Curricula shows some major reforms which have taken place during the last two decades. We are now going through a period of transition from department based Subject Centred Curricula to variations of Integrated Curricular models.

Curriculum planning should essentially continue as a dynamic process, unless one of several of the curriculum diseases such as Curricular Sclerosis or Curricular Ossification, sets in as described by Abrahamson[19]. In most of the new schools one could find critics who would argue —

"We have learned the traditional way and there is nothing wrong with us".

"There are reports that even some American schools are reverting back to the old curriculum".

While rebutting similar arguments, Tyler[20] comments —

> "The institution does not automatically help implement necessary changes. In fact, an institution is commonly a means of maintaining the status quo..... A common generalisation in Sociology is that institutions tend to forget their clients after some time and begin to be dedicated to a programme that was developed initially simply to serve those clients."

Usually the new schools have an advantage over the older ones in that it takes time to forget their clients. However the problem remains with the model of which they are aware. Recent recommendations from the Association of American Medical Colleges titled as, "Physicians for the Twenty-First Century",[21] addresses the problems discussed in this paper and gives direction for the future of medical education.

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