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Medical Education: The Next Revolution?⁺

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Summary

Contemporary medical education, based on ideas and methods developed in the 19th century, no longer prepares medical graduates for careers in the 21st century. Changes and improvements in health care systems will demand changes in the way doctors are educated, and how their values and attitudes, as well as their knowledge and skills, are shaped.

Serious questions are being raised about what is taught in medical school, how it is taught, where it is taught, and who does the teaching. In the future medical schools will need to use active, problem-based teaching methodologies that encourage students to "learn how to learn". Educational activities will take place in community settings as well as within hospitals, and general practitioners will play a much greater role in undergraduate education (HK Pract 1997; 19: 365-371)

摘要

源自19世紀，基於構想與規律的當代醫學教育，將不足應付21世紀畢業醫學生工作上所需，隨著社會保健體制的改變與進步，將會對醫學教育方法、醫學生的職業道德、態度、知識及技能等出現重大影響。

其中被提及的嚴肅問題包括教學內容，如何教導，在何處教學與及誰人負責教導等。未來醫學教室需要運用主動及問題為基礎的教學方法，鼓勵學生“學習如何學習”。屆時，教學活動將會在醫院及社區中進行，而全科醫生將會在醫學生教育中擔任更重要地位。

Introduction

Last year, in the 1996 Dr Sun Yat-sen Oration,¹ Professor Wes Fabb suggested that Medicine is on the brink of a major transformation, the effect of which will be to bring patient-centred care and the doctor-patient relationship to the centre of medicine, and to act as a counter to the adverse effects of technology and economic pressures on patient care.

Today, I want to suggest that in order to bring this about, another and

parallel transformation is required in our current system of medical education, that will bring student-centred learning and the teacher-student relationship to the fore-front.

What I wish to argue is that contemporary education no longer prepares today's medical graduates for the careers that will carry them well into the 21st century, based as it is on ideas and methods that were developed in the 19th century.

The new millennium is likely to bring challenges in many areas:

a) Medicine will be characterised by rapid and constant change. The information explosion will continue, particularly in areas such as molecular biology and immunology. New methods of care, and new systems of health care delivery, will be needed in response to the development of new understanding, and new technologies. Health care delivery structures will continue to evolve, and systems of managed care and budget holding will emphasize the importance of

⁺ This paper was presented as Dr. Sun Yat-sen Oration on March 16, 1997.

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the "gatekeeper" role of primary care.

- b) Demographic shifts will play an increasingly important role, and an ageing population with a much increased prevalence of chronic and incurable disease will present challenges to a medical system that currently emphasises cure over care.
- c) There will be changes in the nature of disease, with the continuing emergence of new and aggressive forms of antibiotic resistant infectious diseases.
- d) Concerns about the costs of health care will preoccupy governments, and lead to cutbacks in health care funding and an increased focus on preventive care. A much greater proportion of health care will take place in community settings, as hospital care becomes increasingly expensive. Coupled with this will be an increased demand for health care professionals with the skills to provide effective community-based care.
- e) Medical advances will result in new and ever more complex economic and ethical challenges. Health care rationing, the use of technology to prolong life, terminal care and euthanasia are just a few of the areas which will provoke continuing and contentious debate. At the same time, patients will have a more sophisticated understanding of medicine. They will have high

expectations, and will be prepared to resort to litigation more often.

Despite these challenges that their graduates will face, there is increasing concern that most medical schools offer an educational programme that looks to the past rather than to the future, and that emphasises the virtues of a health care system that is no longer appropriate for these changing circumstances.

Changes and improvements in health care systems demand changes in the way physicians are educated, and how their values and attitudes, as well as their knowledge and skills, are shaped. As a result, serious questions need to be raised about what is taught at medical school, how it is taught, where it is taught and who does the teaching.

What students are taught

With a few striking exceptions, medical school courses around the world are remarkably similar. Students spend their first two years in lecture halls, dissection rooms and laboratories learning what are referred to as the "basic sciences" of anatomy, biochemistry and physiology, with later additions of microbiology, pathology and pharmacology.

It is not until after the completion of the pre-clinical years, and a series of tough examinations, that students are finally introduced to patients. During their clinical

clerkship students undertake required rotations of varying length in traditional disciplines such as internal medicine, surgery, paediatrics, psychiatry, obstetrics and gynaecology, and a variety of sub-specialties. These clerkships are followed by another daunting series of examinations, after which successful students are awarded their basic qualification, and then move on to internship and residency training.

The course is characterised by *factual overload*, and this is not a new problem. Back in 1877 Thomas Huxley wrote: "The burden we place on the medical student is far too heavy, and it takes some doing to keep from breaking his intellectual back. A system of medical education that is actually calculated to obstruct the acquisition of sound knowledge and to heavily favour the crammer and the grinder is a disgrace".

The approach to education developed at the end of the 19th century, and perpetuated in medical education today, was satirised by Charles Dickens in his novel "Hard Times". "In this life, we want nothing but Facts, Sir; nothing but Facts", declared Mr. Gradgrind, who saw his pupils as "...little vessels, then and there arranged in order, ready to have imperial gallons of facts poured into them until they were full to the brim".

If things were bad in 1877, they are far worse in 1997. The exponential increase in knowledge in the basic sciences means that students drown in a sea of facts, often of questionable relevance to modern clinical practice. Nor, in an

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already overstuffed curriculum, is there room for education in fields that may once have been seen as peripheral to medicine, but which are now recognised as being central. Communication skills, medical economics, medical ethics, epidemiology and information sciences can all rightfully make a claim on the student's attention, but there is little room in the curriculum for the addition of new topics, however relevant they may be.

Modern educational programmes in medicine will of necessity concentrate on the acquisition of ideas and understanding, rather than chunks of information. In contrast to Mr Gradgrind's reverence of facts, John Steinbeck argued that "Mankind climbs the staircase of his concepts", and this concentration on broad understanding will help free students from information overload. Facts are ephemeral, but the ideas that underlie medical practice are much more enduring.

A reduction in the amount of "stuff" that students have to learn will leave them free to explore increasingly important areas such as medical ethics, the economics of health care, and the critical appraisal of research data. They will also be encouraged to use their time to acquire a solid grounding in communication skills and doctor-patient relationships, and to develop values and attitudes that will help them to become humane and effective clinicians.

At the same time, and perhaps most important of all, they will "learn how to learn". Perhaps the

most destructive effect of the educational forced feeding that has characterised medical school curricula is that it blunts the ability of students to learn for themselves, and does not allow students to develop the skills in continuing medical education that will be so important later in their careers.

How students are taught

Medical schools, like cigarette packets, should perhaps be wrapped in a Government health warning, "This institution is dangerous to your health". There is now a wealth of information, from abroad² as well as locally,³ that medical school is a stressful experience, that often results in significant psychological and medical problems for the students. Not only that, but it also has the effect of turning interested and idealistic young people into detached and cynical individuals in a remarkably short period of time – a process that has been referred to⁴ as "traumatic de-idealization".

The problems caused by the crowded timetable are compounded by the educational methods used. The emphasis is on the didactic delivery of information, with a focus on the acquisition, retention and regurgitation of facts, tested at regular intervals by searching examinations. The result of such an approach is predictable. Students learn the information they need to pass the next examination, and immediately afterwards wipe their memory banks clean to leave room for the next batch of facts. They have difficulties in integrating

information from different disciplines, the ability to communicate effectively takes second place to the ability to memorise, and there is an emphasis on rote learning at the expense of reasoning.

Doctors of the future will have to balance the competing demands of the new technologies for acute care medicine with the management of disability and loss of function due to old age. They will need to be much more adaptable, and able to factor economic and ethical costs into medical decision making that previously only involved issues of diagnosis, prognosis and therapy. Business management, economics, the ethics of limited resources and the politics of health care will demand an increasing proportion of the doctor's attention.

At the same time, the doctors will need to cope with an ever increasing knowledge base, and to keep learning throughout their professional careers. Several decades ago it may have been possible for medical schools to equip their graduates with the sum total of the knowledge and skills to carry them through a practice career, but that is certainly no longer the case. Young physicians need to learn how to learn, in order to keep up to date in a rapidly changing world. The present medical curriculum, encouraging as it does a passive and uncritical approach by students, does nothing to foster the development of these important self-learning skills.

In the traditional "teacher-centred" curriculum, the teacher determines what is to be taught,

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when, in what dose, and in what way. The student's role is to act as a passive recipient of information, and the emphasis is on teaching rather than learning. By contrast, the newer "student-centred" approach to curriculum design puts much more emphasis on learning by the student, rather than teaching by the teachers. In such courses the learners take centre-stage, and the principles of adult learning are utilised: The students are encouraged to build on their previous knowledge, to identify their own learning needs, and to plan and evaluate their own learning.

One educational method that achieves the aim of such "student-centred" activity that is gaining increasing attention and use in medical schools is Problem Based Learning, or PBL. In PBL, learning takes place in the context of a problem or a dilemma – in medicine, it is often a clinical situation. Students analyse the problem, using their prior knowledge to explore the dimensions of the problem and to help them decide what they need to know. The gaps in their knowledge then become learning objectives, which direct their search for additional information and knowledge. After a period of independent learning, the students return to reapply their new-found understanding to the problem, and to evaluate the learning that has taken place.

In many ways, PBL turns the traditional curriculum upside-down. In the traditional approach, students learn a mass of theory, to be applied to problem situations sometime in

the future, whereas PBL encourages learning through the exploration of a problem.

There is now a good body of evidence that a PBL approach encourages "deep learning", and that information learned in context in this way is retained far longer, and can be recalled and applied much more effectively than information taught in a traditional curriculum. Students who learn in this way are more flexible, and can readily incorporate new ideas into their management of patients. It is also motivating and fun for the students to explore "real" problems early in their careers – and by no stretch of the imagination can a conventional medical curriculum be described as fun.

Where medical education takes place

There are problems not only with the content and methods of medical education, but also with where it takes place.

Medical school education remains firmly centred in tertiary medical institutions, with a resulting emphasis on complex hospital care. Students therefore learn about medicine by studying the 5% of medical problems that are dealt with in the hospital setting, but generally ignore the 95% of conditions that are dealt with in the community.

The result of such a focus is that students develop an approach to health care that is dependent on the use of expensive technology, and that

overemphasises an interventionist approach to patient care. They are unaware of the challenges of community based practice, ignorant of the management of undifferentiated illness, have a superficial understanding of the issues involved in chronic and preventive care, and are not exposed to the general health care needs of the communities they are destined to serve.

In particular, the absence of role models in family medicine means that students learn to discount the value of a solid core of primary care as the foundation for an efficient health care system, and consequently favour careers in specialist areas. However, with the increased emphasis on the role of the family physician as a gatekeeper in managed care and other modern health systems, there is a sudden scramble to train primary care providers. This means that schools must in the future focus much more clearly on care within the community, and ensure that a significant proportion of their educational programmes take place in community settings, with family doctors being involved in all phases of the curriculum.

In many parts of the world, and Hong Kong is a striking example, the neglect of teaching in primary care at the undergraduate level is compounded by a lack of post-graduate training for family physicians. If it was ever true that a basic medical education provided the knowledge and skills needed for primary care, it is certainly no longer the case today. As a result, many countries now insist on a period of

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postgraduate training before doctors are allowed to enter family practice.

The lack of enthusiasm for primary care careers may also result from the types of students who are taken into medical school. Students accepted to medical school are often academic high fliers, whose single minded concentration on their studies has rewarded them with high marks, but perhaps has also led to a very limited view of the world, and little interest or skills in developing or maintaining inter-personal relationships. Students such as these may not be well suited for careers in primary care where communication skills and a lively interest in people is an invaluable asset. Accordingly, changes may need to be made in the way students are selected for medical school training.

Who does the teaching

Inevitably, the emphasis on hospital based teaching has meant that specialists rather than generalists have played the key role in teaching medical students.

Indeed, fifty years ago this was seen as an admirable development, with the potential teaching role of general practitioners being completely discounted. As one commentator⁵ said at the time, in response to the suggestion that general practitioners should be involved in teaching, "...the general practitioner would be completely out of his element, his daily life casts his mind in a mould which unfits him for systematic teaching....the gulf between the hospital and domiciliary aspects of medicine cannot be bridged".

This attitude is changing rapidly in many parts of the world, as it is being realised that generalists can make a significant contribution to medical education, both in the medical school itself, as well as in their community practices. Indeed, the newer educational methods such as PBL are particularly suited to the talents of general practice teachers, valuing as they do a holistic approach to problems, and the central role of the teacher-student relationship.

General practitioners can contribute at all levels of the programme, and in a variety of roles. As PBL tutors they can facilitate student learning, and encourage them to take a broad view of health care. As communication and clinical skill preceptors they can help students acquire the inter-personal and technical skills needed for effective practice. As community supervisors, they can demonstrate the importance of a personal doctor working within an efficient primary care sector.

In many parts of the world, family doctors have taken a leading role in the revolution in health care education. Family doctors in this community face some significant challenges, in terms of facilities and funding, if they are to take a leading role in Hong Kong, but opportunities are there to be grasped.

What changes are needed?

It has become apparent that in order to embrace these changing needs in medical education, a fundamental change is required in

medical schools, rather than just cosmetic tinkering, and in 1988 a World Conference in Medical Education⁶ attended by delegates from some 60 countries affirmed the urgent need for significant reform of medical education.

Medical schools around the world are slowly coming to terms with this, and while their programmes take different directions, they are based on a shared philosophy that results not only from a recognition of the new demands their students will face, but also on a more sophisticated understanding of the educational process itself.

What are the philosophies that will underpin this new approach?

1. Most important will be the recognition that schools will no longer be able to equip students with all the information they will need for a lifetime of practice. Rather, the emphasis will shift to encouraging students to learn how to learn, in order that they will be able to continually adapt their methods of practice to keep abreast of changing information, diseases, and conditions of practice.
2. There will be much more integration within the curriculum. Subjects will become less and less discipline-based, and will emphasize the inter-connections rather than the divisions between different fields of knowledge.

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3. There will be less emphasis on didactic teaching, and more opportunities for students to work on their own, and in small groups. This will encourage self-learning, communication skills and the ability to function effectively in a team.
4. Much more of the educational experience will take place in community rather than hospital settings, and students will begin to work with patients much earlier in the course. Primary care physicians will assume an important role in medical education.
5. Medical ethics, medical economics, and doctor-patient relationship skills will demand much more of the students attention. Room for this will be made by a dramatic reduction in the amount of factual material that students will need to digest.
6. Greater emphasis will be placed on the use of information technology, both in helping students to learn, as well as providing them with new tools for patient-care management.
7. There will be many more opportunities for students to explore areas of interest in elective time. Students will be able to undertake courses that more closely match their own interests and talents, while at the same time learning a core of material that will be the same for everyone.

8. Finally, the move to a student-centred community-oriented approach, linked with a positive student-teacher relationship, will parallel exactly the increased emphasis on patient-centred, community-based patient care that many of us see as the cornerstone of medical care in the next millennium.

In summary then, the current system of medical education was introduced at the end of the last century. I believe that it no longer serves the needs of health care at the end of this century, and it certainly does not equip doctors for practice in the next one.

In many ways medical education has been treated as something of a poor relation, with funding and accolades going more often to those engaged in research or patient care, rather than teaching. Whether future systems of health care will develop that will ensure that patients are cared for in an effective, economic, ethical and humane fashion, will depend to a great extent on how well we prepare our students.

At present there are significant problems with what students are taught, how they are taught, where they are taught and who teaches them. We have developed a system of education that emphasises memorization over understanding, with an inappropriate overemphasis on the rare at the expense of the common, and with a reliance on specialists at the expense of generalists.

What is needed to help reverse this situation?

First, medical schools must have the courage to face up to the problems created by their current curricula, and I am pleased to report that the Faculty of Medicine at The University of Hong Kong is presently engaged in a far-reaching process of curriculum reform.

Second, politicians must begin to pay more than lip-service to the central role of primary care, and in this respect I regret to report that Hong Kong lags far behind the rest of the developed world.

Third, those responsible for the provision of health care in community settings must accept that they have a responsibility for providing educational experiences for medical students, if those students are to develop skills in the effective delivery of primary, community-based care.

Finally we, the community of family physicians, have to accept our responsibility to play a full part in medical education. The efforts of the Hong Kong College of General Practitioners in postgraduate education are second to none despite the barriers that exist in Hong Kong, and the evidence of the College's success are the graduates whose achievements we celebrate today. It is now time for the College and its members to play a central role in undergraduate medical education.

Dr Sun Yat-sen, in whose honour this oration is named, led the

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revolution that overthrew the last oppressive dynasty in China. Today, I would like to suggest that his general practice successors in Hong Kong have the opportunity to take a leading role in a revolution in medical education that, while perhaps less dramatic, may lead to changes in the understanding and delivery of health

care that are also fundamental and far-reaching. ■

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