THE STATE OF PLAY IN 1999

Basic science in medical education

Tom M. Scott, PhD

Introduction

As advances in technology and cell biology expand diagnostic and therapeutic options, we need to have a strategy for curriculum maintenance that takes these advances into account and delivers appropriate training. Have we coped in recent years? How will we ensure that we can deliver in the future? How we address these questions will depend on the particular circumstances of each medical school. Memorial University of Newfoundland is one of the “new” smaller schools. We recently celebrated our 30th anniversary. Our intake class is 60 students, of whom 45 are Canadian and 15 international (mainly American). A major focus at Memorial University is the provision of physicians for the province of Newfoundland and Labrador, particularly in the field of family practice. In considering a response to the challenge of rapid and significant change in the practice of medicine, it might be of value to consider the following 5 questions.

1. What understanding of basic science is required by graduating MD students?

Students who graduated over the past 100 years had a very different understanding and knowledge of basic medical science, depending on when they graduated. In the early years of this century, anatomy was a major component of undergraduate training, together with some physiology, chemistry and physics. In recent years, graduates were expected to have an extensive knowledge of pharmacology and cell biology. Over that period, knowledge in all areas of basic medical science has increased, yet we have not developed a strategy to cope. Most learning in the basic sciences is still directed toward a knowledge of facts. This has proved to be of poor service to the learners since, at least in physiology and pharmacology, the facts have been changing! Principles are more enduring than facts. Recent curriculum reform has attempted to identify what it is that an undifferentiated graduate should know. However, curriculum reform takes time, and it is accepted that over the time it takes to develop a new curriculum and to deliver it, it is already out of date much like a new textbook. In most medical schools, basic science education precedes or accompanies clinical training. During the clinical training it is obvious, at least to the students, what basic science understanding they need in order to acquire the necessary clinical skills. In most medical schools there is not much communication between the basic science faculty and the clinical faculty and students in clinical clerkships. How, then, should it be determined what students need during their training and by graduation?

An essential part of developing an appropriate strategy is the setting of objectives that take into account the changing nature of facts and the application of new knowledge to the practice of medicine. Objectives to meet the needs of the learners as they enter the clerkship can be set in such a way that they require the teachers and the learners to continuously examine the demands of the clerkship, in the expectation of change. A system that expects to have to make adjustments must have a mechanism built in to allow those adjustments to be made. An essential part of this mechanism...
is to ensure that timetables have a large amount of unallocated time. The teaching-learning methods must also be suited to a situation in which the curriculum content is expected to change from one year to the next. In this way we can ensure that the basic science needs of the learners in preparation for clerkship can be met.

But what about graduation and beyond? At graduation, students are dispersed to a wide range of specialty and subspecialty programs, each with a very specific set of basic science requirements. Clearly, it is not possible to prepare students fully for individual programs or for all possible programs. Is it possible to empower the students in such a way that they are able to continue their basic science learning appropriate to their chosen specialty and for medical practice throughout their careers? It has been an aim of undergraduate medical education, certainly since the report of the panel on the general professional education of the physician, that curricula contain elements directed toward the development of lifelong learning skills. Problem-based learning (PBL) encourages the development of such skills. The amount of PBL varies from total PBL in schools such as McMaster University, where the tutorials are the main learning tool, to PBL tutorials inserted into a traditional curriculum as at Memorial University, where lectures are the main tool. Other forms of student-directed learning may also be encouraged, together with opportunities for independent learning. Basic science subject matter can be presented using these formats, accomplishing the dual objectives of increasing the understanding of basic science and developing lifelong learning skills.

2. Who should be responsible for the learning?

As with all adult learners, responsibility for learning and understanding lies with the student. Unless students fully accept this responsibility there is no hope that they will become lifelong learners. The faculty set standards and assist the students in meeting those standards by the provision of learning opportunities and evaluations. At an early stage in undergraduate medical training attention should be paid to ensuring that students do take responsibility for their education. This principle can be supported in many ways, particularly through group learning activities.

3. Who should do the teaching?

Basic science may be taught by any member of faculty who has expertise in the area. It is not necessary to recruit a gastrointestinal physiologist to teach the basic science related to digestion. However, practical problems arise if there are no identified experts. In the absence of an expert, a subject becomes an orphan. Each subject needs a champion. It is very common for subject matter to disappear from the curriculum when a content expert leaves, or for “new” curriculum to appear when a content expert arrives. An identified expert is also necessary as a resource for students learning in a self-directed environment. Responsibility therefore must be clearly identified and acknowledged, and the subject matter supported by encouraging the responsible individuals.

4. Should basic medical science be part of the licensing examination?

The Medical Council of Canada examinations test a student’s ability to practise appropriate medicine to an acceptable level. This must include a certain understanding of basic science. If the student meets the standards, then there is no need to examine basic science separately. The introduction of a basic science examination component might have an inhibitory effect on curriculum development. American schools have found it difficult to change their traditional pre-clinical courses, in part due to the nature of the basic science United States Medical Licensing Exam.

5. Should only content experts teach basic medical science?

Those responsible for teaching in medical schools should be fully qualified for the job. In the case of basic science teachers this would include familiarity with the current literature and current controversies in the subject area. It is not necessary to be a current contributor to the literature in the area, although experience in research in the subject area or in a related area is essential. Basic science teachers must be able to demonstrate that they appreciate that their stu
dents are going to be doctors and must be able to interpret the basic science literature accordingly.