The place of the basic sciences in medical curricula

Basic scientists have been griping for years that vertical integration is unidirectional. While clinical topics are regularly integrated into the early years of medical curricula (traditionally the time slot for basic science teaching), it is perceived to be much less common for the basic sciences to be taught in the later years of the curricula (traditionally clinical teaching time). How real is this perception?

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We must first be clear what we mean by the *basic sciences*. The narrow view is that it refers to anatomy, biochemistry, pharmacology and physiology. Statistics, psychology and sociology are called the *behavioural sciences* or *human sciences*. Pathology is termed a *clinical science* along with clinical pharmacology. Personally I find this subdivision invidious. The idea that pharmacology is something completely different from clinical pharmacology (often the depar- tments are separate and at war with each other), that biochemistry is separate from clinical biochemistry, and that histology and histopathology are poles apart, makes no sense to me. The reason for the separation is the old clinical/pre-clinical divide, usually reflected in a division between those who are medically qualified and those who are not. As to medical statistics, if that isn't a science basic to medicine, what is? In these days of evidence-based medicine, we cannot do without an understanding of basic statistics. With respect to psychology and sociology – and we should really add ethics as well – an understanding of these disciplines *as applied to medicine* is essential if medical students are truly expected to take on board the GMC recommendations.

It is probably true that there is little teaching *by basic scientists* during the later years of the undergraduate medical course, although many immunologists, clinical biochemists and epidemiologists, for example, are non-clinical and are involved in pathology teaching. Most of the basic science is instead taught by clinicians. Surgeons constantly refer to anatomy, endocrinologists to biochemistry, general physicians to physiology, general practitioners to psychosocial issues, public health physicians to statistics. I'm being a bit stereotypical here, but the message is nevertheless clear – clinicians do pick up the basic science mantle in the later years of the undergraduate medical course.

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There is also a bit of pride involved. Just as basic scientists feel uncomfortable trying to put their teaching into a clinical context because of their lack of clinical knowledge, so do clinicians feel uncomfortable teaching basic science aspects of their clinical cases, partly because they have forgotten much of the basic science they rote-learned the night before their exams, and partly because of the huge explosion of scientific knowledge that has taken place over the last 20 years. As a result, many staff choose to stay safely inside their cocoons and don't venture outside their area of expertise, rather than show their ignorance. Admission of ignorance and owning up to one's own limitations is becoming more the done thing, these days.

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With the advent of the new integrated courses, such barriers are beginning to break down. Problem-based learning (PBL) is a particularly good leveller and helps the clinical/pre-clinical divide to disappear. One of the important tenets of PBL is that it is learning *in context*. Students don't just learn their basic science for learning's sake; they learn it because they need it to understand the clinical problems with which they are presented. Because of this contextualization, students perceive the relevance of the basic sciences and their learning is enhanced. Of course, this only addresses the issue around the perceived lack of basic sciences in the later years if PBL continues throughout the course. It is a sad reflection of the in-built conservatism of many of the old-style hospital clinicians that PBL has rarely persisted into these later years.

This is changing, however, and new versions of PBL, so-called 'clinical PBL', are being tried out. One of the medical schools experimenting in this area is at Manchester University, UK. In this edition of *Medical Education*, Paul O'Neill[1] reports that case writers for 3rd year PBLs usually included a few basic science learning objectives (range

Correspondence: Dr Peter McCrorie, Reader in Medical Education, GEP Office, Department of Medical Education, St George's Hospital Medical School, Cranmer Terrace, London SW17 0RE, UK

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0–6 per weekly problem). About two-thirds of these were identified and explored by the students. In addition, students brought out several other new basic science objectives. Progress testing demonstrated an improvement in performance of 4th year students over 3rd year students with respect to the 65 basic science questions asked. Thus, use of PBL *does* enhance basic science learning in the later years.

PBL is not the only way of maintaining basic science learning. Following on from the GMC recommendations, most schools in the UK run Special Study Modules (SSMs) throughout the undergraduate years. Students may select science-based options, even in their last year. Many schools now offer SSMs covering a huge range of topics, e.g. dissection, molecular biology, health economics, medical jurisprudence, plastic surgery, occupational medicine, acupuncture, medical art, a language – even medical education! The opportunity to carry out a science-based research project is there for the taking, and many of the clinically-based SSMs include a statistical element in them.

Another way of tackling the issue for *all* students is to run integrated teaching sessions during the later years

Students also have the option of intercalating a BSc or BMedSci degree prior to qualification. Some schools make this compulsory for all students. A few go a stage further and offer exceptional students the opportunity to intercalate a PhD (the MB PhD pathway). All these options are, of course, just that – optional. Not everyone will take them up.

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Another way of tackling the issue for *all* students is to run integrated teaching sessions during the later years. Here, pure scientists and clinicians join forces and engage in topic teaching. For example, a half day on jaundice might involve the participation of an anatomist, a biochemist, a gastroenterologist, a surgeon, a radiologist, a nurse and a social worker. But this is really a bit contrived. The surgeon could easily deal with the anatomy, the gastroenterologist with the biochemistry. Grand Rounds may be more successful. Here *one* person presents a case to a mixed audience of staff and students. That person could easily be a non-clinical researcher working on a medical problem. The integration of basic science is achieved through the eyes of the researcher, and the student perceives the relevance of the science without difficulty. Once again, it is all down to learning in context.

In summary, there is more basic science learnt and used in the later years of medical undergraduate curricula than is apparent. When the basic science is encountered in context, learning is more likely to occur. Problem-based learning maximises such learning opportunities.

Peter McCrorie
London

Reference

1 O'Neill PA. The role of basic sciences in a problem-based learning clinical curriculum. *Med Educ* 2000;**34**:608–613.