Clinical research: is the filling missing from the medical research sandwich?

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ABSTRACT — Clinical research is essential for patients to benefit from the advances of medical science. Particularly needed are thorough and imaginative investigations into applied physiology, clinical observation, and patients’ experience. This can help clinicians and their patients to distinguish between pathology and healthy variation, interpret diagnostic information, understand what patients want and gain from health care, and apply study results to individuals’ problems. Clinical research has not grown as much as other forms of medical research, and is sometimes regarded as unscientific. Young academic clinicians are often persuaded that the only road to science leads through the laboratory. Clinical research, however, offers equal opportunities for original enquiry, rigour and excellence. The medical research sandwich will continue to provide an unbalanced diet unless research leaders and funders take the clinical setting more seriously.

Articles and letters on ‘the crisis in clinical research’ have recently inundated the American medical literature. The main thrust of these protests is that not enough clinicians are going into research and so the ‘physician-scientist’ is becoming a rare breed of person relative to non-medical researchers, as shown by their share of grant applications, awards and higher degrees.

The argument summarised above misses the most important point. This is that the rapid expansion in medical research is unbalanced, and uses human and financial resources inefficiently. Our concern should be with the development of research that is most likely to lead to improvements in health, rather than with who is doing that research.

What is clinical research?

The phrase ‘from bench to bedside’ is often used to express the continuum between basic and applied medical research. However, much applied research is rightly concerned too with the systems that are used to deliver medical care, with community issues and with health policies, rather than with the sick individual.

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Fig 1. The component parts of the medical research continuum.

Clinical research has variously been termed ‘translational’ (translation of basic science into useful applications), research involving living people or, more widely, as any form of research into the health of individuals or groups of people, including epidemiology, clinical trials and health services research.

The medical research continuum can be split into three main components: basic, laboratory and animal related studies; clinical research with individuals; and research into communities and health care systems (Fig 1).

Research on individuals – the filling in the sandwich?

The problem in clinical research is that the middle tier within the research continuum – research on individuals – is getting insufficient emphasis and funding at present. Just as there is often a mismatch between what patients and health professionals want, so too there is a mismatch between the knowledge that clinicians need and what medical research provides. To address that mismatch, we need research on individuals.

There are three overlapping aspects to research into individuals that are of crucial importance within the medical research continuum: applied physiology, clinical observation and patient experience.

| 1. Basic medical sciences (generally laboratory based) |
| 2. Research on individuals (applied physiology, clinical observation and experiment (including trials), and understanding patient experience) |
| 3. Service delivery and organisation (population/society based epidemiology and health services research) |
**Applied physiology** is an area of clinical research that was pre-eminent in the United Kingdom in the past. It made seminal contributions to cardiovascular and pulmonary physiology, for example. But this area of research has been allowed to wither, and is being replaced by basic science. However, all clinical trial technology depends on an understanding of clinical measurement and outcomes. Without real expertise in this area, we will not be able to understand what happens as we introduce new interventions and technologies to medicine.

**Clinical observation** used to be the bedrock of medical research. Pattern recognition by astute physicians, from Hippocrates to Sydenham and Osler, led to our present classification of disease and differentiation of the normal from the abnormal\(^1\)-\(^13\). Furthermore, there are contemporary examples of outstanding contributions arising from **simple** clinical observations, such as the discovery of Lyme disease\(^14\) or the work of John Fry, who described the natural history of common diseases during a lifetime of general practice\(^14\). Such descriptive research now seems to get little attention, and is considered as irrelevant by many medical academics who regard definitions of diseases as unproblematic. And yet newly recognised conditions, such as Gulf War syndrome, sick building syndrome and chronic fatigue syndrome, arising from new social and physical environments, challenge our concept of health and disease\(^15\)-\(^17\). Understanding variations in health states is clearly necessary, both for our understanding of disease and for diagnosis.

Diagnosis, too, is an area in need of more research. We need large, simple studies of clinical examination to sort out the validity of the bedside techniques that we tend to take for granted\(^18\). Rigorous comparisons of diagnostic clues (symptoms, signs and test results) with health outcomes or with results of definitive tests are relatively scarce in the medical literature. However, research of this sort is viewed as second rate, unexciting and unimportant in comparison with the seductive molecular and cellular biological techniques that dominate most medical research organisations.

### Key Points

- **Medical research is unbalanced, with insufficient emphasis on clinical observation and problem solving**
- **This limits its ability to help clinicians and patients solve real problems**
- **The central problem concerns ‘what kind of research’ rather than ‘who does it’**
- **Rigorous clinical research is just as scientific as laboratory research**

The third strand is research into the individual's experience of disease, illness, sickness and health. This is not a new area of research, but it is one that has gained new prestige through the development of qualitative research methods\(^19\) and interest in fields such as narrative based medicine\(^20\). Quantitative measurement of health outcomes has helped place patients' experiences at the centre of clinical trials\(^21\). However, these promising fields are still relatively neglected. An understanding of the needs, expectations and experiences of individuals is of crucial importance if we are to match technological advances and sociological changes with what people really need and want.

### What research is being done?

These three strands of individual or patient based research are all relatively neglected by academic leaders and funders of research, with a consequent loss of the skill base in these areas. Yet this type of research is of crucial importance to the overall aim of improving the health of individuals.

In order to try to gain some empirical evidence to support or refute our hypothesis, we have examined higher degree theses awarded by our university this century, and tried to examine them for research trends within the structure that we have suggested.

At the University of Bristol, all theses accepted for the award of a higher degree are housed in the library, and a catalogue is kept, listing each candidate with the title of the thesis. This catalogue was scrutinised, and all MD and PhD theses within the Faculty of Medicine examined for one full year in each decade since records were kept (from 1912 to 1999). From the title alone, the theses were classified as basic research, research on individuals, or community based research. The results are shown in Table 1.

The rise in numbers of people doing higher degrees over the last three decades is dominated by basic rather than applied research, and any increase in applied research of late has been more in the community based subjects rather than in individual applied research. These data also predict the direction of research in future decades, as doctoral students continue their research careers.

### Table 1. Doctoral research in the medical faculty, University of Bristol.

| Year | PhD | MD | Basic | Individual | Community |
|------|-----|----|-------|------------|-----------|
| 1919 | 0   | 0  | 0     | 0          | 0         |
| 1929 | 0   | 1  | 0     | 1          | 0         |
| 1939 | 0   | 3  | 0     | 2          | 1         |
| 1949 | 2   | 2  | 3     | 2          | 1         |
| 1959 | 2   | 3  | 3     | 2          | 1         |
| 1969 | 23  | 8  | 22    | 7          | 2         |
| 1979 | 28  | 4  | 29    | 3          | 0         |
| 1989 | 50  | 7  | 52    | 4          | 2         |
| 1999 | 88  | 19 | 91    | 5          | 11        |
We have not tried to relate these data to the primary degree or the specialty of the person doing the work (physician, basic scientist or other). We are not particularly concerned with the ratios of doctor to non-doctor researchers. We are, however, concerned at the implication that doctors embarking on research careers believe that they must do their doctoral research in the laboratory. For this they have little prior training. It seems strange to take promising young physicians and surgeons interested in research, put them into basic science laboratories for a few years, and then send them back into clinical practice. Surely the scientists are better at basic science, in which they are trained. Clinicians should be encouraged to work in applied clinical science, in which their training gives them a comparative advantage and in which their clinical experience is greatly needed.

Where do we go from here?

The data quoted, with all their shortcomings, support the hypothesis that the relative growth of basic and clinical research is disproportionate. We are losing expertise in, and understanding of, clinical science. This could lead to a serious gap in the research agenda, with deleterious effects on our ability to make use of the advances in basic medical sciences.

A cursory review of the leaders of our main academic medical and surgical departments suggests that most devote their research efforts to the basic sciences rather than to applied work. The way forward is for all clinical academic departments to balance their basic science with applied science, and to appoint researchers with expertise in both individual clinical sciences and in community based sciences. These last two roles could be filled by social scientists, epidemiologists or other types of scientist, as well as, or instead of, 'physician-scientists'.

Furthermore, we must counter the pejorative way in which the term 'clinical research' is often used by medical academics. The argument that laboratories provide the only environment in which young doctors can obtain a 'rigorous' research training is flawed and deleterious. The forms of individual research highlighted above, as well as the population based applied research, demand as much, if not more, rigour and care as does laboratory work. They also have the advantage of being multidisciplinary, increasing the opportunity for research training.

High quality clinical research is at the cutting edge of medical science, taking on big questions about how best to improve the health of individuals. It must be recognised as being at least as valuable as the laboratory based basic medical sciences.

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