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## Guest editorial

# The ethics of ignorance

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'Even the wisest of doctors are relying on scientific truths the errors of which will be recognised within a few years time,' wrote Marcel Proust a century ago. At that time most people understood the severe limitations of medicine, but today doctors are viewed as having enormous power. Medical research is seen by the public as the 'most scientific' form of scientific research (1); television programmes tend to promote a hi-tech, triumphal view of medicine; the newspapers are filled with stories of breakthroughs; funds are raised to send a small girl across the Atlantic to have her life saved by a highly complex transplant operation; and people believe that medicine has left the age of leeches and cupping to enter a scientific era where most of life's ills will be cured if enough money can be raised to pay for the essential research.

Most doctors feel uneasy with this view of modern medicine. Managing cases of multiple sclerosis, Alzheimer's disease, disseminated cancer, or ulcerative colitis, they know that doctors can often do little. Yet doctors as well believe that modern medicine is increasingly scientific and that most diseases will eventually succumb to scientific progress. I want to argue here that the scientific base of medicine is weak and that it would be better for everybody if that fact were more widely recognised.

### What is the evidence of poor evidence?

The first source of evidence that the scientific base of medicine is weak comes from history. Medical history is often presented as a series of discoveries and developments, but most of it consists of journeys up cul de sacs. I recently made a television programme in which we described the case of a Yorkshire woman who died in 1989 in her 70s. Her single case illustrates the failings of medicine. She had had rheumatoid arthritis for 40 years, and during that time she was treated with a diet of raw liver sandwiches, by having all her teeth pulled out, with B12 injections, and with steroids and non-steroidal anti-inflammatory drugs. Just before she died she asked her general practitioner: 'Would I have been as well just to stick to aspirin?' The answer is almost certainly yes.

Medical history of the 19th and early 20th century is full of examples of ineffective operations, ludicrous physical treatments for psychiatric conditions, and

misguided medical treatments. But even in my lifetime we have been through a series of treatments that now look mistaken. I had my tonsils removed in 1959 along with a great many other seven-year-olds, but now the operation is rare. Instead, small children are having grommets inserted for glue ear. Sympathectomy as a treatment of Raynaud's Disease has been and gone. The massive use of 'harmless' minor tranquillisers in the 60s and 70s has now given way to a rash of lawsuits from patients who were damaged by the drugs. Radical mastectomy has almost completely disappeared. The vogue for advising patients who had had heart attacks to spend a fortnight in bed has been reversed. And the enemas, pubic shaving, and intensive fetal monitoring that were the norm when my ten-year-old son was born had all gone by the time my one-year-old daughter was born.

A second source of evidence on the imprecision of medical knowledge comes from the large amounts of work done on variations in practice (2,3). Large variations are found almost whatever medical practice is investigated, but surgical procedures lend themselves most easily to investigation. Thus there are up to five-fold variations within and between countries in operative rates for hysterectomy, cholecystectomy, prostatectomy, herniorrhaphy and, indeed, most operations. Then there are wide variations in types of treatment offered - for instance, for breast cancer. Individual doctors vary widely in, for instance, whether or not they use antibiotics to treat sore throats, how often they refer patients for second opinions, whether or not they admit patients with the same condition to hospital, and how long they admit them for.

Much attention has been focused recently on variations between cultures in how doctors interpret and treat 'diseases' (4). Thus German doctors prescribe millions of pounds worth of drugs, hydrotherapy, and spa treatment for hypotension, a condition which doctors in the United States and Britain do not acknowledge at all. The French prescribe very widely drugs that dilate cerebral blood vessels, while these are considered ineffective in Britain or the United States.

These variations arise because most of the time doctors must act with inadequate scientific evidence. The evidence that does exist is contained in the tens of

thousands of biomedical journals, and close examination of the quality of this evidence shows that it is poor (5,6,7). Thus half of the papers published in medical journals are never ever cited by anybody, and it is hard to imagine that a paper can have any important impact if never mentioned after publication. Then, say a group from McMaster University in Canada, most papers in medical journals do not reach basic scientific standards. They determined 28 basic criteria that should be met in scientific papers and then examined 4000 papers (5). The criteria covered issues like study design, quality of data, statistical references, and documentation. They found that only one per cent of the papers met all the criteria. The group also examined the number of papers that a general internist must read to find a scientifically reliable paper giving information that would affect treatment. Among the five journals of internal medicine examined it was ten, while for the seven general journals it was 20, and among the nine major specialty journals it was 25. Members of the same group have examined the quality of review articles in medical journals and found that their quality is generally poorer even than that of the original articles – which is not surprising as they have a less clear structure and are often not peer reviewed. But it is disturbing as they are usually better read than original articles.

The quality of medical ‘knowledge’ has been examined in detail by Professor Eddy, an American cardiothoracic surgeon with a PhD in mathematics (8). He – and others, such as Sir Douglas Black, a former president of the Royal College of Physicians of London – argue that only about 15 per cent of medical interventions are supported by solid scientific evidence; in other words, 85 per cent are not. Professor Eddy now runs a consultancy in which he helps expert bodies produce consensus statements. He begins by asking them to determine the outcomes in which they are interested and then to gather all the evidence relevant to those outcomes and rank its quality. From 21 problems examined the evidence was ranked – by the experts – between none and poor (9).

Professor Eddy’s interest in the quality of medical evidence began with a detailed study of treatments for arterial blockage in the legs and glaucoma. These subjects were picked almost at random, but it was important that they are common problems with ‘well established treatments’. Thus for arterial blockage there are two main treatments – angioplasty or surgery. Eddy searched published medical reports back for years and found 39 relevant papers. Twenty-seven were excluded straightaway because of their poor scientific quality, but of the 12 studies remaining none were controlled, much less randomised; six mixed treatment for claudication with treatment for salvage; there was no common format for reporting outcomes, making comparison difficult or impossible; none reported both short and long-term outcomes; and they differed in types of patients, techniques used, and the skill of the surgeons. There was thus no reliable

evidence on whether surgery or angioplasty was the better treatment.

Eddy then investigated glaucoma, a condition that affects 1.5 million people in the United States. The standard treatment is to use drugs to reduce intraocular pressure. Surgery or laser treatment may be used later, although laser treatment is sometimes used initially. Eddy researched back to the turn of the century and identified dozens of studies comparing one medical treatment with another. These studies showed that there was nothing to choose between them except in terms of side-effects. There were, however, only four ‘controlled’ studies of treatment against nothing, and of these none was randomised, all were small, and three showed that treatment worsened prognosis. There is thus really no evidence that treatment works.

Having identified the lack of a scientific base to the treatment of glaucoma, Eddy examined in detail the editorials in journals and the tracts in textbooks recommending treatments for glaucoma. He found that often statements were not supported by any evidence at all, that recommendations were grossly oversimplified, that the rationale contained logical errors, and that some recommendations were refuted by the evidence.

### **Does the ignorance of doctors matter?**

No treatment is without its dangers, and if doctors use treatments where they have no solid scientific evidence of benefit they are exposing patients to risk when there may not be benefit. There is also what might be called a breach of contract in that the patients assume that the doctors know that the treatment they are using is beneficial. That the doctors themselves may not understand that the evidence for the treatments they are using is weak or non-existent seems to me to explain but not to excuse the breach of contract.

The lack of evidence of benefit also means that resources may be wasted on ineffective practices. Resources are always limited, and the lack of evidence means that we cannot concentrate them on treatments that are effective. Indeed, resources may be diverted from more effective uses – either within or without the health-care system.

### **Why is our evidence so poor?**

The importance of health means that practitioners are constantly obliged to act with inadequate evidence. But there seems to me also to be a ‘folie à deux’: doctors want to believe that they know more than they do both because it feels good and because ‘knowledge is power’; and the public like the idea that doctors will cure them or keep them from death.

The poverty of our knowledge is also explained by the complexity of health care which arises because of biological variability, the probabilistic nature of most outcomes, the variability with which interventions are applied, the rapid rate of change in health care, the

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criteria of the 'just-war' tradition, but my normative point is that similar questions and criteria emerge in any context where we contemplate making an exception or overriding a moral obligation or moral presumption, such as the rule prohibiting the taking of human life.

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sheer number and range of interventions, and the difficulty of conducting experiments. Indeed, chaos theory suggests that the complexity of health care may make it intrinsically unpredictable (10): we may never be able to know what we would like to know.

### What can be done about our ignorance?

Our first priority must be to understand the extent of our ignorance and share it with the public, patients and policymakers. To some extent this is happening but mostly the urge to confess to limitations is driven by the fear of being sued. Litigation against doctors does seem to be a nemesis for what Ivan Illich called their hubris (11).

Charting our ignorance should also allow us to set research priorities: we should concentrate on researching what we most need to know. The setting of research priorities cannot, however, be driven entirely by the need to know because many things that we would like to know may at the moment be essentially unknowable – for example, an effective treatment for dementia would be wonderful but is unlikely to be forthcoming when our knowledge of brain function is so primitive. A more honest admission of ignorance might mean an increase in funding for research and technology assessment, and even if new money cannot be found it might make sense to shift resources from the provision of unproved services to research.

Those who fund research and publish its results may need to set higher standards, and everybody involved in health care and research should insist on evidence for statements and should focus on outcomes. There is already an increase in consensus statements and practice guidelines, but these need to be examined

critically. Finally, there needs to be more analytical training in medicine: doctors need to be better at assessing the quality of the evidence on which they base their practices.

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