LIFE AND DEATH **Iona Heath**

Dare to use your own intelligence

With an ever increasing gap between research and practice, where should responsibility for clinical decision making lie?

Every week the accumulation of research papers in this and other journals across the world adds to our knowledge and understanding of biology, disease, and treatments. The past 100 years have seen huge advances in medicine's ability to relieve suffering and to extend life. The paradox is that we seem to forget as much as we learn as fast as we learn. Someone whose contribution we seem in danger of forgetting, at least in medicine, is Karl Popper, professor of logic and scientific method at the University of London from 1949 to 1969.

Popper argued: "It might be well for all of us to remember that, while differing widely in the various little bits we know, in our infinite ignorance we are all equal." And he warned us to "suspect all those who claim that they are authorized to teach the truth." His crucial assertion was that we can never establish the truth of any scientific theory; we can simply subject it to the severest tests in a deliberate attempt to prove it false. The most we can then claim is that any given theory has not so far been proved false.

Where do such arguments leave the world of randomised controlled trials and of a clinical medicine that is based on the authority of guidelines? Much of the use of the randomised controlled trial in medicine follows what Popper describes as "the tendency to *verify* our laws and schemata by seeking to apply them and to confirm them, even to the point of neglecting refutations." Statistical analysis and the convention of standard deviations from the norm are used to confirm the theory in question, but the real interest is arguably in the few cases that lie outside this predetermined range and whose existence refutes the theory. Let us take a very simple example, the "truth" emblazoned on cigarette packets: "Smoking kills." And indeed smoking undoubtedly contributes to the premature death of thousands of people every year—a discovery of immense importance. Nevertheless, a very significant few people who smoke regularly for many, many years live well beyond the average expectation of life. The oldest smoker on my list is due to celebrate her 100th birthday in three weeks' time. Popper would argue that more can be learnt from those who, like my patient, are the exceptions to the apparent rule than from those who conform. What makes some people apparently and relatively immune from the pernicious effects of smoking?

A much more contentious and immediate example is provided by the studies underpinning the preliminary recommendation from the UK National Institute for Health and Clinical Excellence (NICE) not to support the use of bevacizumab, sorafenib, sunitinib, and temsirolimus as NHS treatment options for advanced renal cell carcinoma (*BMJ* 2008;337:a1262). Clearly, very serious questions need to be asked about the cost effectiveness of these four drugs. It is highly likely, however, that in all the trials considered by NICE there will have been a very small minority of patients who responded to each of the treatments much better than most. Our current convention for advancing medical understanding systematically ignores these outliers, but these patients are the ones who refute the current state of theory and require a new understanding to make sense of their experience. At the moment they simply constitute Feinstein's clinicostatistical tragedy (*Journal of Clinical Epidemiology* 1998;51:297-9).

Popper argued that "the significance of observations and experiments depends *entirely* upon the question whether or not they may be used to *criticize theories*." And that "the conscious task before the scientist is always the solution of a problem through the construction of a theory which solves the problem; for example, by explaining unexpected and unexplained observations." Now I may be ill informed, but it seems to me, from the perspective of clinical practice, that contemporary medicine pays little attention to unexpected and unexplained observations.

The likelihood of my being ill informed is made proportionately more likely by the increasing gulf between research and clinical practice for all but a privileged few. For Popper, the purpose of science is to explain the "phenomena of experience," and it follows that medical research should seek to explain the phenomena of clinical experience. Yet the gulf between research and clinical practice seems to be widening. We are developing a two tier system, with researchers and some fortunate clinician researchers at one level and the vast bulk of clinicians confined to another level where knowledge is simply handed down in guidelines, incentives, and imperatives that they have had no opportunity to influence and that sometimes conflict with their clinical experience. But Popper cited "authoritarianism in one or another of its many forms" as a real danger to the progress of science; within an increasingly authoritarian NHS we must surely begin to fear for the progress of medical science.

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Popper invokes Immanuel Kant and his doctrine of autonomy: "[This is] the doctrine that we cannot accept the command of an authority, however exalted, as the ultimate basis of ethics. For whenever we are faced with a command by an authority, it is *our* responsibility to judge whether this command is moral or immoral. The authority may have power to enforce its commands, and we may be powerless to resist. But unless we are physically prevented from choosing the responsibility remains ours. It is our decision whether to obey a command, whether to accept authority."

Where does this leave the quality and outcomes framework?

In 1784 Kant wrote, in his essay "What is Enlightenment?": "*Sapere aude!* Dare to use your own intelligence! This is the battle cry of the Enlightenment." It should also be the battle cry of every clinician.

I thank Gordon Gaskell for reminding me of the importance of Karl Popper and for encouraging me to read *Conjectures and Refutations: The Growth of Scientific Knowledge*, from which all the quotations above have been taken.

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