

Karl Popper Memorial
Lecture; LSE November 2007
The philosophical surgeon:
in defence of evidence-
based medicine

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Introduction

I had always been interested in the history and philosophy of science since embarking on my academic career in the early 1970s. This was in part due to the influence of one of my brothers, Professor Harold Baum, who went on to become Dean of Life Science at Kings College, London. I even went so far as to list this interest, along with the history of fine art amongst the subjects I dabbled in, when composing my first entry into Who's Who. I identified myself as a Popperian for reasons of taxonomy and a wish to impress my friends. You can therefore imagine my surprised delight on hearing from my hero in person sometime in 1991, when I was invited to look after a close friend of Karl who had just been diagnosed with breast cancer. When I asked him "why me?" he replied that it was because of my entry in Who's Who. If I wanted a surgeon to cut me open my first wish would be that he was a master of his craft, the fact that he might have an interest in philosophy would be well down on the list of personal traits I would be looking for. Never the less things went well and I became pretty friendly with the old man in the last few years of his life. We exchanged letters on matters philosophical and I was invited to tea on the very day he took delivery of the first Russian translation of "The Open Society and its Enemies". In his excitement he signed a copy of the English version for me, which remains one of my most precious keepsakes. The last communication I had from Karl was a letter dated 4/1/93, referring to some papers I sent for him to critique upon which he commented favourably. The last line of his last letter read; "For me, the most interesting of your papers was, 'Limitations of non-science in Surgical Epistemology', I hope you may find time, one day, to discuss these issues with." Sadly I didn't but that is the theme of my memorial lecture.

The philosophical surgeon

There is an old joke doing the rounds of the cocktail party circuit which runs as follows: A hostess introduces two strangers to each other, one a doctor and the other a lawyer. The lawyer goes on to say 'Oh so you're a doctor. I must tell you this screamingly funny story about a surgeon'. To which the doctor replies 'I think before you go any further, I ought to warn you that I am

a surgeon'. Quick as a flash the lawyer responds: 'in which case I will tell it very slowly!' Once again the stereotype of the surgeon is reinforced as an unthinking technician, so that the very title 'philosophical surgeon' might be read as an oxymoron.

In defence of the thinking surgeon, I wish to propose that a modern surgeon practicing evidence-based, humane and ethical medicine, must have a sound grounding in some of the fundamental principles of philosophy. I shall illustrate these principles, drawing on 40 years experience as a surgeon within the NHS and in particular my specialist practice in the diagnosis and management of breast cancer.

The epistemology of medicine

Epistemology is a bit of a mouthful that simply means the study or the theory of the growth of knowledge - or putting it another way, how is it that we know certain facts to be true. At the most simple level our observations can be misleading, and so called 'common sense' is no substitute for a systematic approach to the acquisition of knowledge. Primitive man 'knew' that the Earth was flat and that the Earth was the centre of the universe. For all intents and purposes it made little difference to the way of life in primitive communities, but these firmly held beliefs were false. The recognition that the world was round and that the universe was heliocentric rather than geocentric were scientific observations of seismic importance in the history of mankind.

All undergraduates should understand this period of history where the theories of Copernicus and the observations of Galileo changed man's status in the universe, and opened minds to a systematic pursuit of knowledge from the age of enlightenment to the present day. The playwright Bertold Brecht put the following words into the mouth of Galileo: 'It is not the purpose of our science to open the gates to infinite wisdom but merely to set the limits to the extent of our ignorance.' If that is indeed the case for the study of cosmology, which has little impact on the day-to-day life of even the most sophisticated

communities, how much more so does it apply to our lives when facing their premature end under the threat of cancer or cardiovascular disease.

Inductive logic versus deductive logic

It was Aristotle and other great names of the golden age of Pericles in the ancient city of Athens, who were the first to apply a systematic approach to the pursuit of knowledge. They recognised that our conceptual model of the world around us was a figment of our imagination, and it was therefore necessary to systematically collect observations to challenge this view. These observations were built up into a conceptual model (hypothesis), and later observations were selected to corroborate this model.

The process of collecting observations in defence of a hypothesis is known as inductivism. Inductive logic was considered 'science' up until the eighteenth century, when the Scottish philosopher David Hume finally illustrated the poverty of the process. Perhaps the best way of illustrating the poverty of inductivism as it relates to our lives as medical practitioners is to consider the subject of *alternative medicine*.

When doctors attack alternative medicine or appear sceptical to its much-trumpeted claims, we are often accused of being bigots with closed minds, protecting a closed shop. Nothing could be further from the truth, but it has taken a layman, the late great John Diamond, to find the words to set the record straight. For that reason I would like to quote from his posthumously published book 'Snake Oil and other Preoccupations' [1].

'I am not an academic and this is not an academic book, even though the facts I list in it have a perfectly good scientific basis to them but when it comes to human motivation I am working blind. I can only guess why most people seem to prefer the unproven to the proven, the anecdotal to the rigorously demonstrated, and the so-called natural to the scientific'. There is much within that passage, on the nature of proof, the nature of the scientific method, and the use and abuse of anecdotal evidence.

The alternative practitioner can trace his roots back to Galen in the second century, and a metaphysical belief system based on the balance of *natural humours*. For example, Galen believed that breast cancer was due to an excess of *black bile* (melancholia). Inductive support for this belief came from the observation that breast cancer was more common in post-menopausal women than pre-menopausal women, and this was thought to be because the menstrual flux in pre-menopausal women got rid of the putative excess of black bile. The therapeutic consequences of this belief therefore were purgation and venesection (bloodletting). The inductive 'proof' that this approach worked were the anecdotes about women with breast cancer who were treated by purgation and venesection, and who lived for several years after diagnosis. Those who died were the victims of the blood letter who didn't have the courage of his convictions, or the patient herself who lacked the constitutional vigour to sustain prolonged bloodletting.

There is a neo-Galenic doctrine, based on the view that breast cancer is indeed due to an imbalance of nature, only substituting *energy fields* for the natural humours. According to this view, to restore perfect health you have to restore the balance of these metaphysical *energy fields*. This might be achieved by acupuncture balancing out the ying and the yang, homeopathy (*simularis simulabum curantur*), or strange balancing diets. The Gerson diet in particular is very fashionable.

In fact, one of my patients, seeking to improve my education, gave me a book describing this approach [2]. The first half of the book formulates the hypothesis why this strange diet should improve the balance of the immune system, and the second half of the book consisted of 50 anecdotes of patients with cancer, who were only given six months to live by the medical profession, took the diet and lived for a long time.

The trouble with that kind of evidence is that although we know the numerator (50) we don't know the denominator - for example, 50 out of 1000 cases treated by neglect could indeed live for many years while the indolent disease

progresses on the chest wall. Furthermore, from the evidence available in the book some of the diagnoses were a little bit shaky and the author neglects to mention whether or not these patients receive conventional treatment at the same time as the magic diet. Finally, I know of no oncologist who gives a patient six months to live. We may say that the median survival for a group with advanced cancer is six months, but among this group certain individuals may lie at extremes of survival. These individuals are the substance of the anecdote.

Perhaps I should leave the last word on this subject by quoting from Robert Parks wonderful book *Voodoo Science*. '*Alternative* seems to define a culture rather than a field of medicine – a culture that is not scientifically demanding. It is a culture in which ancient accretions are given more weight than biological science and anecdotes are preferred over clinical trials. Alternative therapies steadfastly resist change often for centuries or even millennia, unaffected by scientific advances in the understanding of physiology or disease' [3]. If that is the case then who are the bigots and who are the ones with the closed minds?

Deductive logic and the randomised controlled trial

The alternative to alternative medicine should be scientific medicine, not 'orthodoxy'. By science, I mean the application of deductive logic. The deductive approach starts with the formulation of the hypothesis, but for a start the hypothesis must be rational in its explanation of the disease process or therapeutic intervention. By 'rational' I mean built upon the growth of knowledge of human biology and physiology from the past 100 years or so, without invoking magic or metaphysical principles.

Even so, the new hypothesis is still perceived as a fictional account of reality and subjected to rigorous test by the design of experiments challenging the new theory with the 'hazard of refutation'. These experiments in medical or surgical therapeutics must have control groups treated by observation, placebo or 'best available therapy'. Without the control group we merely have

a series of anecdotal reports. What I have just described is in fact a randomised controlled trial.

Breast cancer and the randomised controlled trial

As I have mentioned, up until the eighteenth century, if breast cancer was treated at all was treated according to the principles of Galen. It wasn't until the mid-nineteenth century that it became widely accepted that cancer was a disease of cellular pathology originating within the breast and spreading centrifugally along the lymphatic system. The therapeutic consequence of this belief led surgeons to embark on radical surgery that involved removing the breast and all the regional lymphatics. It was left to William Halsted in the 1890s to refine the operation into the classic radical mastectomy, with the intention of ridding the body of the primary cancer and its lymph node secondaries. Sadly, the only support for this radical treatment was anecdotal. If the patient survived it was due to the success of the surgeon. If the patient died it was either because the patient came too late or the surgeon lacked the courage of his convictions to complete a truly radical operation.

It was only when Dr Bernard Fisher in the 1960s challenged the conceptual model of the disease that progress started to be made. In other words an antithesis was constructed to challenge the prevailing dogma. Fisher taught that contrary to popular belief, breast cancer cells spread throughout the body through the venous drainage of the breast, and at the time of clinical presentation of the disease, the majority of breast cancers were in fact systemic disorders. If that was indeed the case then there are two therapeutic consequences. Firstly, that radical surgery is shutting the stable door after the horse has bolted. Therefore the role of local therapy is local control, which would equally well be achieved by breast conserving techniques such as lumpectomy and radiotherapy. The second therapeutic corollary is that if indeed the disease is systemic at the time of diagnosis then the only way to improve cure rates is through chemotherapy or hormone therapy.

However, the greatness of Dr Fisher, ably supported by surgical acolytes all around the world, was not simply to accept a new set of beliefs in place of an old set of beliefs, but to challenge the new paradigm using deductive logic: in other words, through randomised controlled trials. One of the great success stories of modern medicine has been the painstaking series of randomised controlled trials in the management of early breast cancer over the past 30 years. We now know with extreme confidence that breast conservation is a safe alternative to radical mastectomy, although not in itself improving cure rates, greatly enhancing the patient's quality of life. We also know with extreme confidence that treatment using either endocrine or cytotoxic regimens will improve survival. The final demonstration of that truth has been the dramatic fall in breast cancer mortality in the UK and North America since 1985, following the first publication of the world overview of trials [4].

Using breast cancer as an example, we can demonstrate that the philosophy of science that underpins the randomised controlled trials has led to the dramatic improvement in length of life and quality of life for women inflicted with this dread disease. However this isn't the end of the story, as new biological hypotheses are being generated with new therapeutic consequences, all of which will be tested in the randomised controlled trial, which is now accepted as the most scientific and ethical way of conducting medicine in times of uncertainty.

Conclusion

Karl Popper inspired me, taught me to think critically and changed my life from that of a technocrat to that of a scientist. Science fed my curiosity and my original observations provided an open ticket to travel the world. I shall therefore leave the last word to him;

"It is not truisms that science unveils. Rather, it is part of the greatness and the beauty of science that we can learn, through our own critical investigations, that the world is utterly different from what we ever imagined-"

Endnotes

[1] *Snake Oil and other Preoccupations*, John Diamond, Vintage Random House UK, 2001

[2] *A Cancer Therapy: results of fifty cases and the cure of advanced cancer by diet therapy*, Max Gerson, Gerson Institute Bonita, California, 1986

[3] *Voodoo Science*, Robert Park, Oxford University Press, Oxford, 2000

[4] 'Sudden fall in breast cancer death rates in England & Wales', Beral V, Hermon C, Reeves G, Peto R,. *Lancet* 1995; 345:1642-3