

Scientific thinking: Its Relevance to the Quality of Care

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The quality of care depends heavily on the knowledge, skills and attitudes of those who make health-care decisions and those who carry them out. This applies whether these decisions are made on behalf of an individual patient or at the aggregate level.

Medical education therefore, plays a critical role in developing the quality of care.

Both medical education and, increasingly, the education of nurses take place in an university or a university-like setting. During the educational years, the student will be taught factual knowledge, practical skills and the moral dimension of attitudes.

In universities the ambition also is to introduce students to "scientific thinking", which is both "know-how" and an attitude. It deals with methods, used to purify knowledge through the testing of hypotheses, and with moral attitudes to that body of knowledge which is called science.

Science and scientific thinking are concerned with the development of new knowledge which has general validity and is generally accepted. Scientists test their hypotheses by asking the question: true or false.

As health professionals in their daily work do not focus on the development of new general knowledge, they do not ask the question: true or false. Their work is mainly concerned with action and policies geared to good health care, so they ask the question: "What ought to be done?" This "ought" is not a scientific question. They also ask: "What ought to be done for this patient or this community?" This question is not general a one, but an individualized one. Nevertheless the answer to this "ought"-question may be based on scientific knowledge, and therefore the "ought" may be a technical "ought" and not a moral one.

Mostly, however, science does not offer clear-cut answers to the question of what ought to be done; the professional is faced with choices, uncertainty and value judgements and the "ought" becomes a moral one. It is this switch from the technical "ought" to the judgemental "ought" which forms the borderline between scientific medicine and the art of medicine, and

it is here that the problems arise in both medical education and the practice of medicine.

At this point, it may be useful to define what I mean by the word science. To many physicians science is defined by the "scientific" method. Science is a body of knowledge arrived at by means of a specific method which guarantees a high degree of reliability (truth). And scientific method is defined by the production of science. This definition comes dangerously close to a circular reasoning. Scientific method has been discussed over the years from Bacon, Hobbes and Hume to Popper, who proposed the falsification approach, and Feyerabend, who stated that any method may be used in science.

I should like to use Kuhn's approach, where the emphasis is on social qualities. Science is a body of knowledge which is a product of collective human enterprise, to which scientists make individual contributions that are purified and extended by mutual criticism and intellectual collaboration. In other words, science is a body of knowledge, generated within a particular framework of thinking and generally agreed upon. Mathematics, physics, chemistry and biological sciences such as physiology, biochemistry and anatomy fulfil the demands of an unambiguous language and a great deal of consensus. This is, however, not true for the behavioural and social sciences and humanities, which have such an enormous influence on health care. Clearly, ethics and medico-legal matters fall outside this definition of science. But also psychology and sociology become difficult to characterize as science because their concepts are sometimes imprecise and ambiguous. At times there is a lack of experimental reproductability, and there is doubt about some of their constructs. And particularly, consensus is not always present.

Furthermore, sociology and behavioural psychology are concerned with models. Doctors and nurses are mostly concerned with individuals. Administrators and politicians working with aggregates may be more interested in these models, but very few of them realize that the activities of formulating models and studying their implications are much more of a conceptual exploration. Very often people tend to regard these activities as falling within the

framework of biological science. The models are regarded as empirical hypotheses and tried in the traditional scientific frame of reference of true or false, verification or falsification.

If this line of thinking is accepted, then we must consider health care and the practice of medicine as not a scientific endeavour but a humanistic one, which sometimes makes use of scientific tools to establish the necessary body of knowledge for decision-making. Then, of course, the term "health science" as at present used loses its sense as a description of the activities and instead simply becomes a name of some transsectoral activities related to the establishment of good health care practices.

Still, science is obviously one prerequisite for good care, but even if science is an essential ingredient in medicine, it does not automatically follow that scientific method is an essential ingredient in the daily work of medicine nor that scientific thinking is that specific state of mind which gives quality to daily clinical work.

To discuss this matter I shall turn to the consumer's perspective on health care.

Two issues related to the quality of care have been in the limelight of public debate during recent years. These are the dehumanization of medicine and the large variation in practice styles between physicians and hospitals.

The dehumanization discussion has occupied both the public, the media and the philosophers, while the variation in practice has caused worries to planners, economists and politicians.

In both cases blame has been put on the education of physicians and on the present philosophy of medicine. Those concerned with the dehumanization problem accuse modern medicine of being too biologically oriented, too scientific, and using a mechanistic, inductive approach rather than a holistic and humane one to patient problems.

Those concerned with "small area variation" underline the lack of objectivity and scientific approach to patient care and charge medical education and medical practice with ambiguity, lack of knowledge, lack of consensus, and lack of a common language.

What is the truth of these two apparently contradictory accusations against modern

medicine? Do they reflect nothing other than modern academic medicine's inability to meet the needs of society?

In the book Pathologic basis of disease, S.L. Robins tells us: "In the final analysis we are all a bundle of cells cast in the form of a biped." This is just a modern version of what Descartes said: "The body is a machine, so built up and composed of nerves, muscles, veins, blood and skin, that ought there were no mind in it all, it would not cease to have the same functions."

The opponents to this view claim that man is more than just a sum of his parts, and for this reason man's illnesses cannot be dealt with in a scientific manner alone, and that scientific analysis and method alone is not the appropriate approach to health care.

While the sociological and behavioural approach to patients may be more holistic, it approaches illnesses in terms of models, that is through a set of regulative or critical standards. However, these standards are often subjective and in essence they may often be nothing but a different mechanistic approach to man and illnesses.

For the care of the sick person, therefore, something else seems to be necessary. This could be an effective ability to communicate with a fellow human being. Such ability is based on self-knowledge and self-understanding, on the capacity to imagine scenarios similar to the patient's experiences and feelings. Communicative skills of this kind do not rely on scientific thinking but depend on personality and experience. They are taught through literature, through models and mentors.

The dehumanization of modern medicine is usually exemplified by the horrors of the intensive care unit, the futility of heroic surgery and oncological treatments - what in American medical literature is sometimes referred to as "aggressive treatment".

Also mentioned quite often is the expanded use of diagnostic procedures with the objective of classifying the patient's illness into a preconceived mechanistic diagnosis classification that is of little or no consequence for the patient's treatment or well-being.

Those concerned with the dehumanization of medicine postulate that narrow scientific thinking pursued beyond the borders of science is the

culprit behind the problem. They propose a revision of medical education so that it teaches the limitations to "scientific methods" and scientific thinking. They want to introduce into the curriculum a body of knowledge which supports communication and empathy.

Let us look at the other major point of criticism, the issue of small-area variation or practice-style variation. While those concerned with dehumanization cherish the holistic and individual approach to diagnosis and therapy which necessarily will create variation, those concerned with small-area variation are looking for uniformity.

For planners and economists who work in models, and politicians who work in ideologies, it is highly disturbing that people live and act as individuals, that they have different needs and wishes. Even when it comes to the way they experience themselves and their bodies, people vary. For planners and policy-makers variation creates a problem. The mechanistic view and reductionist science is the ideal, and aberrations from the norm can be dealt with only by laws, regulations, guidelines, model care programmes, protocols etc.. The study of small-area variations has revealed such heterogeneity in medical practice that it is out of question to discuss health care as a scientific undertaking, and it strongly raises the issues of education, values, and modes of decision.

In both these cases of criticism that I have mentioned, the common denominator is the use of technology. In both cases the accusation is that modern medical technology is used inadequately. And technology is applied science, the very essence of the success of modern academic scientific medicine.

Now here are two columns:

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| SCIENCE | - CREATION OF NEW KNOWLEDGE |
| APPLIED SCIENCE | - SOLUTION OF A PRACTICAL PROBLEM |
| TECHNOLOGY | - GENERAL SOLUTION TO COMMON PROBLEM |
| APPLIED TECHNOLOGY ON GROUPS OF PATIENTS | - ROUTINE APPLICATION IN HEALTH CARE |
| TECHNOLOGY USED ON THE INDIVIDUAL PATIENT | - CLINICAL DECISION-MAKING |
| ASSESSMENT OF USE | - OUTCOME EVALUATION |

If we look at these two columns, which start at science, then we shall see that scientific methods take a diminishing role as we move down the column.

It is equally clear that psychology, sociology, economy and ethics play an increasing role further down the column. The underlying value in the practice of science is truth, but the underlying value in the use of technology and in clinical decision-making is utility.

If we return to Descartes and Galileo, they found that science was concerned only with primary qualities, that is things which could be weighed and measured. Secondary qualities like beauty, love, meaning, value were not included in science. They distinguished between *res extensa* which could be measured and divided, and *res cogitans* which is unmeasurable and indivisible. This distinction between mind and matter, the objective and the subjective, has followed us ever since. Health care is however distributed across both areas.

The present problem is whether it is possible to evolve a science of the secondary qualities and consciousness. Then reductionist thinking would not have to explain phenomena outside its frame of reference. Brian Goodwyn at the Open University has coined the term "science of qualities" as a complement to the quantitative science, which is the current approach, with the objective of explaining the relationship between different subjective phenomena in the same way as reductionist science does for the objective world.

If such a dualistic approach could be achieved, then science and scientific thinking would become the core issue of medical education, and the road to high quality of care.

Although the accomplishments of academic medicine and the success of biomedical science are well recognized by almost everybody, there is an increasing feeling that society's needs demand a redirection both of health care and of medical education.

The health problems today are the aging society, chronic illnesses, ego and ego-conflict problems, multiple social and behavioural risk factors, economy, demands for autonomy - not to mention hunger, unemployment and war. Some of these may not be helped by scientific thinking or a traditional scientific approach.

Moreover, while the power and emphasis today are located in institutions and hospitals, this may not be true in the future, when they may move to the homes and to primary health care. The type of social control over the quality of care might differ substantially in years to come, and the educational basis for dealing with this would need a curriculum geared to public needs and trust, with more emphasis on such subjects as the philosophy of science and medicine, the history of medicine, medical ethics, decision theory,

technology assessment and quality assurance in medicine, biostatistics, health economics and epidemiology, if we want to improve the quality of care.

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