

The modern scientific physician: 1. Can practice be science?

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Today's thoughtful practitioners of health care are prone to be confused about some of their fundamental commitments as professionals. Most notably, perhaps, they may wonder to what extent they actually still are genuinely committed to care for the health concerns and needs of the patients or communities that they are supposed to be caring for, now that they also are supposed to serve the third-party payers' interests in cost containment. Related to this, as professional societies and others increasingly issue guidelines for care, with economic assessments in addition to medical judgements as inputs to these, how faithfully are they to follow these guidelines instead of applying their own judgements — in the spirit of the Evidence-based Medicine (EBM) movement¹ in particular?

While physicians' answers to such now-topical fundamental questions indeed are prone to reflect confusion, nevertheless clear and uniform is today's physicians' commitment to practise *scientific* medicine, to be a scientific physician in this sense. Moreover, the commitment is to practise as modern, and thereby presumably as advanced, a variant of scientific medicine as possible. After all, the original concept of scientific medicine is a century old already.²

However firm and indeed genuine this commitment may be, there nevertheless is no common understanding of what it means to practise "scientific medicine" even in the modern typical — let alone in the modern avant-garde — meaning of this term. Very notably, our eminent dictionaries of medicine^{3,4} define neither scientific physician nor scientific medicine, while defining folk medicine³ and alternative medicine,⁴ for example.

The pursuit of common understanding of the common, central commitment obviously is important, even if it won't be easy. In this pursuit, the proper point of departure is to recall those highlights of the past that bear on the now-prevailing ideas about the essence of medicine in general and of scientific medicine in particular.

Today's medicine still draws from two very different cultures in ancient Greece, around the 5th century B.C.⁵ The still-current symbol of medicine — the staff entwined by two serpents — originally was (with only one serpent) the symbol of Aesculapius, that son of Apollo who was taught medicine by the learned and wise centaur Chiron. From the myth of Aesculapius, the father of Hygeia and Panacea, had arisen the concept of god-physician and a vast culture of magico-religious medicine, with temple-centred ritualistic 'cures' provided throughout the Aegean lands.

The continuing retention of that ancient symbol does not, however, signify continuing commitment to its associated original ideas.

As for substance, we now appreciate that on and off the Greek coast of Asia Minor, at that same time, empirico-rational medicine was thriving, with Hippocrates its most illustrious leader. It banished gods from medicine, and as replacements of them it introduced diagnosis and prognosis, their deduction from symptoms. Based on its novel emphasis on facts and learning from those facts, the art of medicine progressed substantially. The Aesculapian concept of god-physician thus got to be replaced by its Hippocratic counterpart — that of the learned physician, one who also is wise, modest and humane. The still-modern 'Hippocratic' oath of medicine, by the way, derives from the Aesculapian culture.

Learning from the facts encountered in practice has contributed enormously to the knowledge base of medicine in the course of the post-Hippocratic millennia; but it also has spectacularly failed. In particular, Galen's authoritative propagation of pre-Hippocratic, and equally Hippocratic, ideas about 'humors' and their 'dyscrasias' sustained widespread use of venesection for a millennium and a half, without the facts in the enormous collective experience providing for learning about its true, largely counterproductive effects. Failures notwithstanding, the Hippocratic empiricist ideal remained unquestioned in the extra-academic mainstream of medical thought until the recent advent of medical science and the kind of practice-oriented academic 'rationality' that was associated with it (see below).

Soon after Hippocrates came Aristotle, that court-physician's son presumed to have 'inherited' the art of medicine from his father. Medicine was taught in his Lyceum, and among his personal precepts was that "the philosopher must begin with medicine and the physician must end with philosophy."⁶ A pre-eminent figure in all of Western civilization, he was the founder of biology among other sciences. Like Plato originally, and just before him, Aristotle distinguished *science* from the *arts* — the latter meaning "productive" arts (*techne*), medicine among these. The essential difference between science and the arts was in the nature of the product: knowledge (*episteme*) versus artifacts or actions. Aristotle also distinguished between theoretical and practical sciences, respectively concerned with truth and action.⁷ Later the term for Aristotle's productive arts got to be "mechanical arts" or "servile arts" — as they were distin-

guished from 'liberal arts,' the latter 'fit for a gentleman.' Today, among the presumably practical medical sciences we tend to distinguish between 'basic' (near-theoretical) and 'clinical' or 'applied' (more-or-less practical) science.

The art of medicine was not very notably advanced by practical science until the dramatic 'field' work of the country physician Jenner on vaccination, and the later, equally dramatic laboratory work of the chemist Pasteur and the district physician Koch. The latter two inspired in physicians the idea that medicine is 'made' in the *laboratory*. Up to the time of Pasteur and Koch, and rather inconsistent with the mechanical art of medicine ('physic'), physicians had commonly been frock-coated in their practices; but then they started to don the scientist's laboratory coat — as if to insinuate to their clients that they practised up-to-date scientific medicine, fresh from the laboratory. To say the needless, the idea and its symbol are with us today.

What is much more, in the avant-garde of the then-modern medicine, *practice got to be regarded as science*. To wit, at the dawn of the 20th century it got to be authoritatively held that "Investigation and practice are one in spirit, method and object."⁸ This idea, too, is still with us. And so is the EBM advocates' recent notion that practice is science when the practitioner can "explain" it in terms of "knowledge, logic and prior experience."⁹

That original practice-as-science concept was predicated on "scientific" education in medicine (à la Hopkins, ca. 1900), with the Hippocratic learning-from-practice denounced as "empiric," something that "at its best ... leaned upon experience" yet something whose "means of analysing, classifying, and interpreting phenomena were painfully limited."¹⁰ The putatively requisite "scientific" education, in turn, was a matter of preparing the future practitioner's mind for scientific rationality through active engagement in the laboratory and in the clinic rather than through didactic studies.¹¹

To this day, these ideas have not been revised, at least not officially. Thus, a current dictionary of medicine still defines medical empiricism as "1. the method of the Empiric school of medicine; opposed to rational medicine. 2. reliance on mere experience; empirical practice. 3. quackery."¹² In the philosophy of science, by contrast, the antagonism between the rationalists and the empiricists was at its

height in the 17th and 18th centuries, while both reason and experience were respected by Aristotle already and have been in science at large ever since Kant.¹²

I continue to hold that, regardless of whatever predicates, the practice of medicine (medicine for short), like farming, for example, is art and not science, in the Aristotelian and still appropriate meanings of "art" and "science." But I also hold that modern medicine can and indeed must be, as much as possible, *scientific art*, art of scientific medicine — analogous to scientific farming. It is the purpose of this series of brief essays to help clarify — in fact, radically to update — this concept and, secondarily, its first-order implications. Much hangs in the balance.

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References

1. Sackett DL, Richardson WS, Rosenberg W, Haynes RB. *Evidence-based medicine. How to practice and teach EBM*. Edinburgh: Churchill Livingstone; 1998.
2. Flexner A. *Medical education in the United States and Canada*. Bulletin no. 4. New York: Carnegie Foundation for the Advancement of Teaching; 1910.
3. *Dorland's illustrated medical dictionary*. 28th ed. Philadelphia: WB Saunders Company; 1994.
4. *Stedman's medical dictionary*. 26th ed. Baltimore: Williams & Wilkins; 1995.
5. Marti-Ibanez F, editor. *The epic of medicine*. New York: Clarkson N Potter; 1962. p. 64-6.
6. Marti-Ibanez F, editor. *The epic of medicine*. New York: Clarkson N Potter; 1962. p. 70.
7. Niiniluoto I. *Is science progressive?* Dordrecht (the Netherlands): D Reidel Publishing; 1984. p. 259.
8. Flexner A. *Medical education in the United States and Canada*. Bulletin no. 4. New York: Carnegie Foundation for the Advancement of Teaching; 1910. p. 56.
9. Sackett DL, Haynes RB, Gyatt GH, Tugwell P. *Clinical epidemiology. A basic science for clinical medicine*. 2nd ed. Boston: Little, Brown and Company; 1991. p. ix.
10. Flexner A. *Medical education in the United States and Canada*. Bulletin no. 4. New York: Carnegie Foundation for the Advancement of Teaching; 1910. p. 52.
11. Flexner A. *Medical education in the United States and Canada*. Bulletin no. 4. New York: Carnegie Foundation for the Advancement of Teaching; 1910. p. 53.
12. DiSanto RL, Steele TJ. *Guidebook to Zen and the art of motorcycle maintenance*. New York: William Morrow and Co; 1990. p. 166.

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