EDITORIAL

Scientific evidence-based medical practice: where now?

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A standard English language dictionary defines science as "The state of knowing: knowledge as distinguished from ignorance or misunderstanding". The same dictionary defines scientific method as "principles and procedures for the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses."

By all usual thinking, western medicine is supposed to be 'scientific' and thus 'evidence-based'. Unfortunately, for many of us who have laboured long and hard, much of what 'western' physicians practice actually may not have as strong a base of evidence as we would like.[1] There are great variations in the quality of scientific evidence that may exist in support of medical diagnoses and treatment. Lawrence has stratified that quality of evidence from best to worst (Box 1).[2]

The *Hong Kong Medical Journal* deserves substantial praise for publishing this exemplary theme issue on 'Evidence-based medical practice'. In the historical overview epidemiology paper,[3] Karlberg kindly credits our journal, the *Journal of the American Medical Association* (*JAMA*), with being the home for many of the founding and developmental papers in this field since 1992. He properly emphasises pioneering work by the Cochrane Collaboration, which, from its roots in Hamilton, Ontario, Canada, now spans the globe with Cochrane Centers from a present home base in Oxford, the United Kingdom. Yes, Professor Karlberg, evidence-based medicine is here to stay and has particular relevance in modern Hong Kong. Woo and Chan[4] provide important reminders of basic principles of ethics of the practice of medicine and point out the great desirability of having evidence available and using that evidence to best treat patients ethically. In so doing, they chart a strategy for research in the Hong Kong locale for applying limited resources to promote the best patient and population care affordable.

Box 1. Quality of evidence of effectiveness of intervention

1. Prospective, masked, randomised controlled clinical trials
2. Controlled trials without randomisation
3. Case-control or cohort analytical studies
4. Multiple timed series studies, with or without intervention
5. Remarkable results in uncontrolled experiments
6. Descriptive studies, anecdotes, clinical experiences
7. Delphi studies or single-pass surveys
8. Nominal group technique
9. Reports of expert committees

Tsang informs the readers about the basis for good clinical research, and the necessity for performing such in compliance with the 'Good clinical practice' document and the International Conference on Harmonization Guidelines in order to achieve respect for one's results, publication in a good journal, and, in the case of a new drug, registration.[5] One of the greatest challenges of modern scientific medicine is to convert new clear information through knowledge into changes of attitude and medical practice behaviour. While there are many successful models for teaching medical students, there are few successful models for the rapid implementation of new correct information (technology transfer) by practising physicians. Hazlett[6] details a purportedly successful Hong Kong effort at workshop-based instruction in evidence-based medicine. Unfortunately, practice outcome improvement was not studied.

In their critical paper, Kumana and Lauder[7] provide a sophisticated insider's view of clinical research, medical editing, and practice decisions. They are correct in stating that all the world is not as clean and clear as the evidence-based medicine paradigm would imply. They should be especially praised for including a reference to Sackett's original paper from the *Canadian Medical Association Journal* in 1981 in the initial series of articles about how to read medical journals.[8] But, in the end, their own interesting paper is not itself a 'systematic review', raising concern about its own potential biases.

There have been four particularly important advances in the reporting of research studies over the

past several years, all of which come under the relatively new scientific category 'journalology'. First, the creation of the structured abstract is best credited to Haynes and colleagues who pioneered this effort with the *Annals of Internal Medicine*.[9] Most other journals resisted this effort at the beginning but over a few years the great majority of the top tier primary source journals adopted the structured abstract in one form or another.

There is variation in the sections of the structured abstract in different journals. We believe that the best way to report original data is in a structured abstract of no more than 250 to 300 words including the following headings: Context, Objective, Design, Setting, Patients (or Participants), Interventions (if any), Main Outcome Measure(s), Results, and Conclusions.[10]

There are two major benefits of using a structured abstract of this sort. First, it provides the reader with a very clear, concise, and simple to read report of the main substance of what is in the paper. This is good both for the reader of the print journal and, especially, the reader of the electronic journal, where abstracts are included in the *Medline* database routinely (while full text is not). Many medical journals provide abstracts free of charge on their Internet sites as well. The clearer they are, the better for all. The second great benefit of the structured abstract is for researchers/ authors to be guided by them in setting up their project in such a way as to be able to prepare a proper structured abstract when the work is completed. It forces organised critical thinking up front, which should be done before the study is too far along to be fatally flawed.

Lying at the bottom (lowest quality) of Box 1 is 'reports of expert committees'. The Consensus Conference or Consensus Statement is a permutation of numbers 7, 8, and 9 of Box 1. This approach is increasing in frequency with multiple organisations applying it to problem situations in which actual scientific study in an experimental question is difficult but on which many people have expert opinions. The evolution of a structured abstract specific to a Consensus Statement is a second great advance in the creation and reporting of this kind of information.[10] The *JAMA* style requires that such a structured abstract be no more than 250 words and consist of the following categories: Objective, Participants, Evidence, Consensus Process, and Conclusions. This is our effort to require the organisers and planners of Consensus Conferences to be as scientific and unbiased as possible in their construction and carrying out of the conference as well as of their report.

The third advance in the field of journalology is the insistence that review articles be systematic, critical, and unbiased, and have structured abstracts.[10] The most elaborate of this type of article is a meta-analysis but there are many other good systematic reviews that do not have to go as far as a meta-analysis. Prior to the use of the structured abstract, many review articles, even in the best journals, were biased in favour of a position being espoused by the author or authors, and the literature selection was a principal reflection of that bias. The systematic review exposes that bias. There is nothing wrong with expert opinion being stated as long as it is clear that it is expert opinion, but in order for a review article to be truly scientific, it must be comprehensive, systematic, data-based, and balanced.[10] Structured abstracts for review articles and meta-analyses for *JAMA* style should be no more than 250 words and should contain the following headings: Objective, Data Sources, Study Selection, Data Extraction, Data Synthesis, and Conclusions.[11] This applies scientific method to the review article which becomes itself a scientific study of a sort, and that is highly desirable.

The fourth advance is the creation of the CONSORT check list for authors submitting reports of randomised controlled trials.[12] Such a checklist includes headings of Title, Abstract, Introduction, Methods, Results, and Comments. Under the Methods section there are subheads of Protocol, Assignment, and Masking with descriptors; under the Result section, the subheads are Participant Flow, and Analysis, also with descriptors. Such a randomised controlled trial may be profiled in a diagrammatic manner to make it easy for researchers to conceptualise, authors to report, and readers to understand.

These four journal efforts are intended to place scientific evidence centrally in the practice of medicine. The best practice guidelines incorporate evidence-based medicine of the highest level following the Lawrence

Box 2. Possible uses of practice guidelines

Improve physician performance by pressure
Consumer choices of physician and institutions
Textbook themes
Professional society membership/educational programs
Relicensure—recertification
Patient-physician consultation to choose therapy
Medical liability court decisions
Payment decisions

hierarchy.[2] Brook has proposed many possible uses of good practice guidelines (Box 2).[13]

Of course, the goal of all of these exercises is to keep healthy people well and to help sick people to gain better health. This involves competence of practitioners and systems. In closing, I offer the following two proposed definitions of competence: (1) "The ability of a person or system to perform a task to achieve a satisfactory outcome to the person involved" or (2) "The ability of a person or system to perform a task at hand, for which he/she/it purports to be competent, in order to achieve an outcome to be satisfactory to the person(s) involved and acceptable to a reasonable group of peers." These definitions become the readers' choice.

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