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Evidence-based medicine

TEACHING AND PRACTISING EVIDENCE-BASED MEDICINE IN SOUTH AFRICA: PROBLEMS AND PROSPECTS

G JUSTUS HOFMEYR

MB ChB, MRCOG

Obstetrician/gynaecologist
East London Hospital Complex

Director/honorary Professor
Effective Care Research Unit
University of the Witwatersrand
Johannesburg and
University of Fort Hare
Alice

The evidence-based approach to health care is based on objective evidence of effectiveness rather than on conventional dogma or clinical impressions.

'We don't like evidence-based medicine'

Problems

As clinicians, our first instinct is to resent evidence-based medicine. We find it difficult to believe that methods we have used for years with apparent success may be ineffective or harmful. Clinical experience has a powerful impact on the beliefs of clinicians, yet our experience is prone to be misleading. Because it is based on a relatively small number of cases it is subject to random error (chance). Both the biological tendency to spontaneous recovery from illness, and the well-documented 'placebo' effect, create an unrealistically inflated impression of the effectiveness of our medical interventions.

Prospects

The most important step in the acceptance of an evidence-based approach is the realisation that our clinical impressions, however deeply ingrained and convincing, may be wrong. Because this realisation is counter-intuitive, the principle is best taught by citing real-life examples.

For decades experts in many countries, particularly in Europe, used phenytoin rather than magnesium sulphate to treat eclampsia, because basic scientific knowledge indicated that magnesium sulphate did not cross the blood-brain barrier, and their clinical experience of the effectiveness of phenytoin was convincing. In the Eclampsia Trial, 388 women with eclampsia were randomly allocated to treatment with magnesium sulphate, and 387 to treatment with phenytoin.¹ Recurrent convulsions occurred in 22 versus 66 women, respectively (relative risk 0.33, 95% confidence interval (CI) 0.21 - 0.53), and death in 10 versus 20 women (relative risk 0.5, CI 0.25 - 1.05). Without an evidence-informed approach, phenytoin would in many countries have remained the treatment of choice indefinitely.

Which evidence is reliable?

Problems

It is difficult to draw conclusions from observations of the effect of most medical interventions without comparing outcomes with a control group that receives alternative care. The only known way of ensuring that those allocated to alternative treatment groups are at similar risk

is if the allocation is entirely random. Even in apparently 'randomised' studies, systematic error may be introduced by compromising the effect of the randomisation in many ways: inadequate allocation concealment; changed group allocation after randomisation; loss to follow-up; unblinded ascertainment; and unblinded subjects.

Prospects

All these sources of bias should be kept in mind when evaluating trial evidence. The process of systematic review of randomised trials, as discussed below, seeks to evaluate the strength of the evidence critically and objectively.

Access to information

Problems

Beginning in the 1970s, Iain Chalmers and colleagues developed the Oxford Database of Perinatal Trials, the first systematic collection of evidence from randomised trials. This was extended to other specialties with the launch of the Cochrane Collaboration in 1993. The systematic reviews are published quarterly in *The Cochrane Library*,² and represent the most comprehensive review of evidence from randomised trials available. However, for many people who work in low-income countries, *The Cochrane Library* is unaffordable and inaccessible.

Prospects

An increasing number of secondary publications are becoming available which are based on systematic reviews such as those in *The Cochrane Library*. Clinical

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guidelines, including those published by the South African Department of Health, increasingly specify the level of evidence upon which recommendations are based. In the field of reproductive health the World Health Organisation (WHO) has developed the *WHO Reproductive Health Library* (RHL). It includes a selection of Cochrane systematic reviews considered of relevance to reproductive health care in low-income countries, accompanied by commentaries and practical notes by writers with working experience in a low-income country environment.³ The RHL disk also contains teaching videos, produced by our unit, on external cephalic version and childbirth companionship. It is published annually on CD-ROM in English and Spanish, and will soon be published in Chinese.

Evidence-based medicine: unmet expectations

Problems

A common reason for disillusionment with the evidence-based approach is unmet expectations. Clinicians faced with a clinical question will, in good faith, consult well-respected sources of evidence such as *The Cochrane Library*, and find no evidence from randomised trials relevant to their question.

Prospects

The truth is, there are huge gaps in the available evidence. Not all decisions can at this stage be based on sound evidence. What is important is that we are aware of the gaps and of which practices are evidence-based and which are not, and in principle exercise caution and conservatism when evidence is lacking.

The group in research trials versus the individual patient

Problems

Knowledge of the effectiveness of alternative forms of care is only the

starting point for clinical decision-making. Clinicians have the task of applying the results of clinical trials to individual patients, who may differ from those represented in trials, in terms of their individual risk factors, the importance they attach to different outcomes, their value systems and their idiosyncratic preferences.

Prospects

Health professionals have the responsibility to provide their patients with advice and information based on the best available evidence, but not to impose treatment. Patients retain the right to take responsibility for their own health in light of their personal beliefs and perspectives.

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3. *WHO Reproductive Health Library*. Available to individuals in developing countries by free subscription: World Health Organisation (RHL), CH 1211, Geneva 27, Switzerland, fax 094122-791-4171; e-mail: RHL@who.ch

THE SOUTH AFRICAN COCHRANE CENTRE – HELPING PRACTITIONERS TO IDENTIFY AND APPLY BEST EVIDENCE IN PRACTICE

NANDI SIEGFRIED

MB ChB, MPH (Hons), FCPHM
Co-director
South African Cochrane Centre
Medical Research Council
Tygerberg
W Cape

JIMMY VOLMINK

BSc, MB ChB, DCH, MPH, DPhil
Professor and Chair of Primary
Health Care
Faculty of Health Sciences
University of Cape Town
Co-director
South African Cochrane Centre
Medical Research Council
Tygerberg
W Cape

It's the Internet Age and we are drowning in information. Keeping up to date with the latest research findings is almost impossible for the busy practitioner, let alone finding the time to read even one medical journal a month! As access to health information increases, so does our patients' knowledge of symptoms, diagnoses and treatments. When faced with a request from a patient regarding the results of a recent trial during which a



Fig. 1. An interactive session in a Cochrane workshop in Johannesburg.

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new treatment for a specific illness was tested, most of us would like to consult an easy-to-use, readily accessible resource. As part of the international Cochrane Collaboration, the South African Cochrane Centre (SACC) based at the Medical Research Council in Tygerberg, Western Cape, is working with practitioners to provide exactly such a resource and the training to use it.¹

The Cochrane Collaboration and The Cochrane Library

The Cochrane Collaboration is an international, non-profit organisation that aims to help people make well-informed decisions about health care. Established in Oxford, UK in 1993 the Collaboration now has over 6 000 contributors, including clinicians, researchers, consumers and policy-makers based on every continent. Members work together in collaborative review groups on specific health problems to prepare and update systematic reviews of the effects of health care interventions.

A Cochrane systematic review differs from a traditional narrative review as it involves specific techniques to reduce bias, namely:

- It addresses a clearly formulated question.

- It uses systematic and explicit methods to identify, select and critically appraise relevant research; these methods are pre-specified in a review protocol.
- Inclusion of studies is not limited by language, country or publication status.
- It uses meta-analysis (statistical pooling of results), when appropriate, to analyse and summarise the results of included studies.
- It is updated periodically.
- It is subjected to extensive peer review commencing at the protocol stage and continuing until the completed review, or its update, is published.

Cochrane systematic reviews (sometimes called 'Cochrane reviews') are published electronically in the *Cochrane Database of Systematic Reviews*, part of *The Cochrane Library* which is available on the Internet and CD-ROM. Cochrane reviews now number more than 1 700 and are:

- indexed in MEDLINE
- recognised as a reliable and authoritative source of evidence on the effects of health care interventions
- used by practitioners around the world
- widely cited in research articles and clinical guidelines.

Assistance with interpreting and conducting Cochrane reviews

As one of only 13 Cochrane centres globally, the SACC is the reference centre for 20 sub-Saharan African countries and aims to promote evidence-based practice throughout the continent.

The SACC has recognised that most clinicians are not trained in epidemiological methods and are not always familiar with evidence-based health care terminology. For those practitioners wanting to learn more about this new science, regular training workshops are held in all the major centres in South Africa and in selected neighbouring countries twice a year (Figs 1 and 2). After attending a workshop, practitioners can expect to understand the principles of evidence-based health care, critically appraise a systematic review, interpret the results of meta-analyses, and use *The Cochrane Library* to maximal effect. These workshops are recognised by the South African Health Professions Council and practitioners earn 7 CPD points for attendance.

In fulfilment of the expectations of the Cochrane Collaboration, the SACC also provides significant support to those who wish to conduct reviews. While support is given regardless of the review topic involved, the Centre particularly encourages reviews that address problems of high priority in the African region. Currently a special mentoring programme is in place for reviewers working in the fields of HIV/AIDS. Under the mentoring programme reviewers are provided with a dedicated mentor, computer facilities, Internet access, database searching and statistical support as required. Six-month competitive fellowships are also available to enable reviewers to spend time at the SACC working under close supervision.



Fig. 2. Participants learning to use *The Cochrane Library* at a Cochrane workshop in Bloemfontein.

How does this help the South African practitioner?

This is best illustrated by the following example from clinical practice:

Your clinical problem

A 45-year-old man presents with a chest infection. He smokes a pack of cigarettes a day and has done so for the past 25 years. How effective is it to provide him with brief advice to stop smoking?

What does The Cochrane Library say?

The review 'Physician advice for smoking cessation'³ states: 'Pooled data from 16 trials of brief advice versus no advice (or usual care) revealed a small but significant increase in the odds of quitting (odds ratio 1.69, 95% confidence interval 1.45 - 1.98). This equates to an absolute difference in the cessation rate of about 2.5%. This means that, based on quit rates amongst smokers in this group of trials, there would be one extra quitter as a result of minimal intervention from a physician for every 40 people who receive such advice.' (Fig. 3.)

Your clinical solution

Clearly, brief advice is effective and your patient stands to benefit from this intervention. The public health impact of a doctor's advice for smoking cessation is potentially very large.

Conclusion

Our patients deserve the best possible care we can give them and remaining up-to-date with the latest research is our responsibility. With access to tools such as *The Cochrane Library* practitioners can obtain the information they need quickly and efficiently. Dedicated to conducting, updating and promoting the accessibility and use of Cochrane reviews, the SACC helps to make practice based on the best available evidence a reality.

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Subscriptions to *The Cochrane Library* can be obtained directly from the South African Cochrane Centre. South Africans can register for free access at www.sahealthinfo.org sponsored by the SACC.

THE ROLE OF EVIDENCE-BASED MEDICINE IN CLINICAL REASONING

VANESSA C BURCH

MB BCh, MMed, FCP (SA)

Senior Lecturer
Faculty of Health Sciences
University of Cape Town

JANET L SEGGIE

BSc (Hons), MB ChB, MD, FRCP, FCP (SA)

Professor of Medicine
Faculty of Health Sciences
University of Cape Town

The universal goal of undergraduate medical education is the graduation of competent practitioners. Competence is defined as the ability to use knowledge, skills and professional judgement to perform effectively in the domain of possible encounters defining the scope of professional practice.¹ A fundamental component of clinical competence is 'clinical reasoning', lately identified as a key learning outcome of current undergraduate medical curricula.² Clinical reasoning is the cognitive skill³ that is needed to integrate various knowledges, skills and abilities into effective solutions to patient problems.¹

How are clinical reasoning skills acquired?

For many novice clinicians clinical reasoning is a skill akin to that of a magician 'pulling a rabbit out of a hat', as they observe patient consultations. Expert clinicians appear to formulate clinical diagnoses, apparently out of nowhere. Schmidt *et al.*⁴ propose that clinical reasoning is a developmental, contextualised skill, dependent upon domain-specific knowledge and skills and cumulative clinical experience. The authors postulate that the ability to make an accurate clinical diagnosis develops in a series of identifiable stages. Thus, students starting their clinical

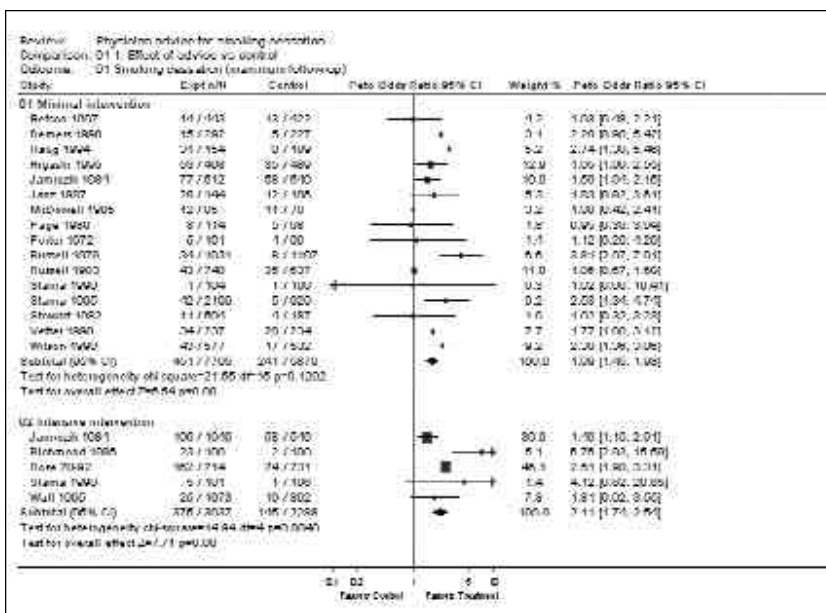


Fig. 3. Results of Cochrane review: Physician advice for smoking cessation.

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clerkship attachments develop elaborate causal networks, based on theoretical knowledge acquired in their earlier 'pre-clinical' years of basic sciences, to explain illness in the first patients they encounter. Subsequently, interaction with ever-increasing numbers of real patients, with the same or similar clinical problems, allows students to 'prune' these elaborate networks and to reorganise them into a more efficient series of 'illness scripts'. These 'illness scripts' are simplified mental models of disease that the student uses to explain clinical 'observables' to arrive at a differential diagnosis and decide upon treatment. It follows that real clinical expertise is the product of hundreds of patient encounters, and elaboration on the part of the experienced practitioner of a huge mental database of 'illness scripts'.

Effective patient care – the practical outcome of clinical reasoning

While an accurate clinical diagnosis is central to the process of clinical reasoning, the concept also encapsulates the choice of 'effective solutions' to patient problems as 'clinical decision-making'. Thus, Dutton⁵ extends the definition of clinical reasoning, characterising it as the cognitive process in which specific knowledge and professional skills are used to forge an appropriate plan of action to restore an individual patient to his or her best level of functional independence. She requires three essential features of clinical reasoning:

- the cognitive process linking knowledge and skills
- the context-sensitive application of appropriate knowledge and skills to an individual patient encounter
- the achievement of a desirable practical outcome.

From Dutton's perspective, clinical reasoning is a holistic cognitive process in which specific knowl-

edge and skills, honed by cumulative clinical experience, are used to identify and define (i.e. diagnose) clinical problems in order to decide upon context-sensitive plans of investigation and treatment.

The relationship between evidence-based medicine (EBM) and clinical reasoning

We have stressed the importance of cumulative experience in the development of expert clinical reasoning and decision-making skills. To 'fill the gap' of personal clinical experience in both novice and senior practitioners, EBM, utilising valid and reliable data gathered from the cumulative experience of others, offers robust scientific method to aid clinical decision-making. Furthermore, EBM assists expert clinicians in making evidence-based decisions outside their fields. EBM is particularly relevant to a developing country such as South Africa, where many clinicians practise medicine in locations remote from well-resourced health care centres with readily available expertise.

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SINGLE SUTURES

Malaria still claims too many deaths

WHO and UNICEF appealed for urgent increased action to combat malaria after the publication of a joint report to mark Africa Malaria Day. The *Africa Malaria Report 2003*, released on 25 April, stressed that the death toll from malaria is still 'outrageously high', killing more than 3 000 children in Africa every day, and that effective antimalarial drugs and insecticide-treated bed nets are not widely available to those who need them.

(*Lancet* 2003; 361: 1705-1706.)

Lifestyle changes in diabetes

Can changes in treatment with lifestyle modification, i.e. changes in diet and exercise, or metformin reduce the conversion from impaired glucose tolerance to type 2 diabetes? This was the question asked in a recent study reported in the *Medical Journal of Australia*. The answer? Both lifestyle modification and metformin reduce progression rates from impaired glucose tolerance to diabetes, but lifestyle changes were more effective than metformin.

(*Med J Aust* 2003; 178: 180-181.)