A reader's guide to the medical literature – an introduction

Over the next several months, the Postgraduate Medical Journal will publish a series of articles which aim to help the reader efficiently search the medical literature and evaluate clinical studies identified through a variety of search techniques. The search and appraisal approaches outlined in this series will focus on solving clinical problems using the most current and valid evidence. Each article in the series will therefore describe a case history and a clinical problem. For example, in the first article (p 6), an internist is asked to provide a critically ill patient's family with an estimate of prognosis for the patient. The clinical problems chosen for each article are highlighted in table 1. Thus, we hope that the 'Reader's guide' series will illustrate how an evidence-based approach may provide solutions in various aspects of patient care such as the prognosis and screening of patients, the benefits or harm of therapy, the use of diagnostic tests and the use of economic evaluations.

One of the major assumptions in writing this series is that the medical literature is daunting and growing exponentially. Even though most of us believe this to be self-evident, we thought it would be interesting to demonstrate the rate of growth over four years. In order to document the increase in the number of citations, we determined the number of citations in Medline for the years 1990 and 1993 in seven medical disciplines (table 2). We arbitrarily chose the fields of critical care, cardiology, gastroenterology, nephrology, oncology, respirology and rheumatology. The number of journals between 1990 and 1994 range from 24 in nephrology to 88 in oncology. It did not surprise us to find that the number of publications increased between 10%, and 29%, in the seven disciplines in the last four years. In oncology, a specialist would be required to read an average of 30 articles per day to keep up with the 10 780 citations per year in Medline.

The search strategies and guidelines outlined in the forthcoming articles were first proposed in a series of articles entitled, Clinical epidemiology rounds published in 1981 by a group from McMaster University.1 This very popular series also led to a text Clinical epidemiology – a basic science.2 The search strategies and critical appraisal principles have subsequently become the backbone for what is now termed 'evidence-based medicine'. Guyatt and colleagues3 have published a series of articles to demonstrate that medical practice is undergoing a paradigm shift from a predominantly anecdotal and personal experience approach towards a more systematic and objective review of available evidence when confronted with clinical problems. Hence the term 'evidence-based' refers to an objective review of available published data. The major features used as part of both approaches are summarised in box 1.

This systematic approach has been used by clinicians and scientists alike for decades. However, in the early part of this century, many of the major medical breakthroughs such as the discovery of penicillin have had such significant benefits that very rigorous study designs were not required. As smaller but clinically significant advances in medical care were sought, more powerful study designs such as randomised clinical trials were developed, and the use of rigorous clinical research methods has now become a necessity for researchers. For the clinician, the vast quantity and variable quality of studies have made the use of

Table 1 Summary of the articles in the series

<table>
<thead>
<tr>
<th>Purpose of the study</th>
<th>Clinical problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prognosis</td>
<td>prognosis following admission into an intensive care unit</td>
</tr>
<tr>
<td>Screening</td>
<td>breast cancer screening in premenopausal women</td>
</tr>
<tr>
<td>Causation</td>
<td>nonsteroidal anti-inflammatories and gastrointestinal bleeding</td>
</tr>
<tr>
<td>Therapy</td>
<td>magnesium administration in acute myocardial infarction</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>the usefulness of urinalysis in the diagnosis of urinary tract infections</td>
</tr>
<tr>
<td>Economic evaluation</td>
<td>low molecular weight heparin following hip replacement surgery</td>
</tr>
</tbody>
</table>

Table 2 Number of citations in 1990 and 1993 in seven medical disciplines (English language journals only)

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Number of journals (1990–94)</th>
<th>Number of citations 1990</th>
<th>Number of citations 1993</th>
<th>% change from 1990 to 93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology</td>
<td>88</td>
<td>8780</td>
<td>10780</td>
<td>23</td>
</tr>
<tr>
<td>Cardiology</td>
<td>69</td>
<td>8003</td>
<td>8797</td>
<td>10</td>
</tr>
<tr>
<td>Critical care</td>
<td>9</td>
<td>802</td>
<td>1045</td>
<td>30</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>49</td>
<td>4990</td>
<td>5673</td>
<td>14</td>
</tr>
<tr>
<td>Pulmonary diseases</td>
<td>40</td>
<td>4042</td>
<td>5028</td>
<td>24</td>
</tr>
<tr>
<td>Nephrology</td>
<td>24</td>
<td>2363</td>
<td>3049</td>
<td>29</td>
</tr>
<tr>
<td>Rheumatology</td>
<td>24</td>
<td>2034</td>
<td>2359</td>
<td>16</td>
</tr>
</tbody>
</table>
Efficient search strategies and critical appraisal criteria are necessary. It has also become apparent that clinicians must be able to determine if study results are valid and applicable to their patients.

The importance of these issues has been appreciated in Great Britain where initiatives such as the Cochrane Collaboration have been pioneered, and the York Centre for Evaluation established (box 2); these initiatives involve systematic reviews of the evidence for clinical interventions according to predetermined criteria. Unfortunately, at present, these initiatives only cover a few medical disciplines. In the few chosen disciplines such as perinatal medicine,6–8 the Cochrane Collaboration provides an invaluable resource for the clinician. However, until the majority of medical disciplines are incorporated into these initiatives, the clinician still needs to be able to seek the best evidence efficiently from the available information.

Advances in computer technology and information management have made access to up-to-date medical information readily available to the busy clinician.9,10 Large medical databases such as Medline may be accessed directly using software such as Grateful Med or by accessing the database stored on CD-ROM. The major difficulties encountered when searching these databases to answer clinical questions are the identification of the correct Medical Subject Heading (MeSH) or textwords and adopting a reasonable search strategy. One of several keywords may often be employed to catalogue an article making the choice of the correct MeSH heading occasionally difficult. Initial attempts at computerised searches often result in the identification of very large number of citations in an effort to be complete. Both of these difficulties may be overcome by soliciting the advice of a librarian13 and eventually through experience in performing searches. This series will provide the reader with some practical suggestions and examples of search strategies in each of the articles.

Despite fairly available and user-friendly computer systems, most clinicians still solve most clinical problems by consulting a colleague or reading a relevant chapter in a textbook. These approaches may not provide the most reliable or appropriate answer for any given problem. When consulting a colleague one recognises that this individual has more experience or a set of skills necessary to address the clinical problem. One cannot overemphasise the role of recognised local expertise in helping to solve difficult clinical questions. However, we should make the distinction between being an expert or an authority and simply being authoritarian. A genuine authority in a particular field will be aware of the medical literature, understand its limitations and recognise the value and limitation of his or her clinical experience. The authority will make full use of the medical literature and guide colleagues to unbiased relevant literature. We distinguish this from simply being authoritarian where the referring physician is only given the benefit of personal opinion. Book chapters and background review articles are often written with a comparable bias in which the author presents a selected overview of the medical literature. The setting in which either the author or the reader practices may also be subject to any number of referral biases which ultimately may influence his or her approach to clinical problems. These differences in approach may limit the usefulness of a review article when the clinician is confronted with specific clinical problems. Nevertheless, reviews which employ reproducible search and evaluation strategies are invaluable tools for the busy practitioner. Textbooks are also used as an initial source of integrated laboratory and clinical information. However, they are often outdated, even at the time of publication. A new generation of textbooks such as the Scientific American series not only provide an integrated review of the literature but are updated yearly. New journals such as the ACP Journal Club or Evidence-Based Medicine search the literature and critically appraise the articles for the reader. These tools and others enable the busy clinician to access the most valid, relevant and current literature.

In many of the articles in this series, when faced with the clinical problem, we recommend that the initial step should be to identify a relevant review article. Optimally, a systematic overview (which may include a meta-analysis) addressing the problem will be identified. These literature-review strategies rigorously apply the principles outlined in this series in an effort to evaluate the evidence and integrate information from primary studies paying particular attention to the selection and quality of the chosen studies. They answer a specific clinical question, describe a search and selection strategy as well as an approach to the evaluation of the articles considered in the review. When two or more articles address the same clinical question, a meta-analysis uses statistical techniques to combine the results. If a well-conducted and relevant systematic overview is not

**Summary of aims of the Cochrane Collaboration and the NHS Centre for Reviews and Dissemination**

**Cochrane Collaboration**

**Aim**
The Cochrane Collaboration's task is to prepare, maintain and disseminate systematic, up-to-date reviews of randomised, controlled, trials of health care, and, when these are not available, reviews of the most reliable evidence from other sources.

**Objectives**
- preparing and developing protocols and software - to systematise and facilitate the preparation and updating of systematic reviews
- the efficient electronic transfer of reviews between reviewers and editors, between editors and the Cochrane Database of Systematic Reviews
- developing policies and setting standards to maximise the reliability of information
- promoting and undertaking research to improve the quality of systematic reviews
- exploring ways of helping the public, health service providers and purchasers, policy makers and the press to make full use of Cochrane Reviews
- organising workshops, seminars and colloquia to support and guide the development of the Cochrane Collaboration

**NHS Centre for Reviews and Dissemination**

**Objectives**
- to commission or undertake reviews on behalf of the NHS focusing on the effectiveness or cost effectiveness of health care intervention, management and organisation of health services
- to then disseminate the results of research to the NHS in order to enhance effective decision making

**Keypoints**
- an evidence-based approach is preferable in evaluating the vast literature in order to make sound clinical decisions
- large databases provide up-to-date and easily accessible medical information
- the way to use the literature efficiently will be outlined in the 'Reader's guide' series
Evaluation of the medical literature

available, we suggest that the best primary studies be sought and evaluated. Background reviews and textbooks may provide a global review but may not describe the most relevant and valid evidence for specific clinical decisions.

Even though the importance of remaining abreast of the literature cannot be overstated, a detailed review of the literature with every new therapeutic or diagnostic dilemma is not feasible. We propose that the reader consider a periodic evidence-based literature review of common clinical problems and undertake less frequent evidence-based searches of rare problems encountered in his or her chosen field of expertise. In this way, clinical skills may improve, the overwhelming task of reading the literature may be made easier and the patient will benefit.

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8 Cochrane AL. Cochrane pregnancy and childbirth database (derived from the Cochrane database of systematic reviews). Published through Cochrane updates on disk. Oxford: Update software. The Cochrane Database of Systematic Reviews 1993; Disk Issue 1.
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