1. Clinical questions and information needs

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Experienced doctors differ from inexperienced doctors primarily in the amount and kind of knowledge they possess and their skills in applying it. In the commercial sector, professional knowledge is now seen as a rare and precious asset to be cherished, mobilized and communicated to improve the quality and efficiency of services[1]. This 'knowledge management' activity has a parallel in medicine—the evidence-based health movement, which focuses on managing evidence, a special form of knowledge[2]. However, despite worldwide uptake of evidence-based health, medicine still has a long way to go to match the care and resources spent on managing knowledge in other sectors. Doctors also need to debate as a profession whether and how to apply commercial knowledge management techniques in health.

This series of articles will contribute to that debate by summarizing what we understand about medical knowledge and how to manage it. It also has a very practical purpose—to help working clinicians improve their own knowledge management activities and those of their organizations, whether in keeping up with the published work or selecting, writing and using practice guidelines and computer packages (Figure 1). We start with clinical questions and how to deal with them.

FORMULATING CLINICAL QUESTIONS

All of us, from time to time, require further information to guide patient management—details of a drug side-effect, a test result, disease stage. The information may be needed to help an immediate decision about a patient, or less urgently to guide the future management of other patients or reorganize our clinical practice. The types of information needed and frequency of needing them were reviewed in 1996[3], and an important study of 1100 clinical questions posed by US family physicians was reported by Ely and others in 1999[4]. One key point that emerged was that the frequency of clinical questions varies according to context and how a question is defined. An average is two clinical questions for every 3 patients[5]. The most frequent single topic about which information is sought is drug points[6]; in a primary-care study[4], at least one-fifth of questions concerned drugs.

The general rate of pursuing clinical questions was low—36% in a US primary-care study[4] and 12% in a UK inpatient study[7]. However, questions about drug dosing were pursued much more frequently, on 85% of occasions; perhaps doctors thought these were most likely to be answered satisfactorily. Overall, answers were found to 80% of the questions pursued.

Making the question clear

A clinical colleague calls you, asking you to tell her about aspirin and arthritis

It is hard to answer such requests for information without knowing the full context of the enquiry. How much detail is wanted? Will the information be used in patient care, or education, or research? And so on. Even knowing that the question is about patient care does not help much: is she uncertain about treating a rheumatoid patient with aspirin, about the risk of aspirin aggravating coexistent asthma, or about using daily aspirin consumption to measure pain intensity?

To generate a clear and useful answer to a colleague's question you need four specific kinds of information—the clinical dilemma (diagnosis, choice of tests, choice of therapy, etc.); the clinical goal; the options being considered, including those already tried or dismissed; and patient data such as diagnosis, previous illness and current clinical findings. The specific information that needs to be communicated in the question varies according to the clinical dilemma; some examples are given in Table 1. This need for contextual information applies whether you are seeking the answer by asking a peer, searching the published work or even planning a research project. Table 1 places in this broader context the 'well-formed question' advocated by practitioners of evidence-based medicine[2]. Sometimes, if we formulate a clinical question in the way suggested and supply missing information (about clinical goals, the options being considered and relevant patient data), we can immediately perceive the answer for ourselves. More often, we will need to check with colleagues, books or other sources.

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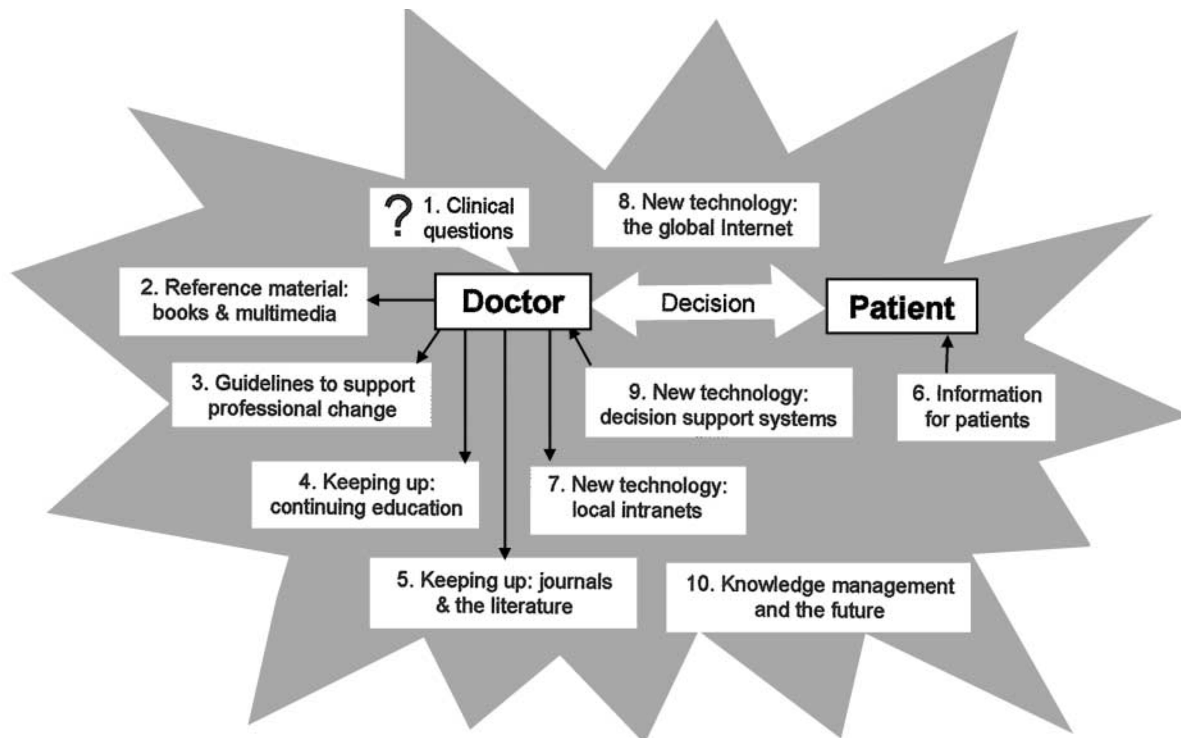

Figure 1 **Structure of Knowledge for the Clinician**

ANSWERING CLINICAL QUESTIONS

You are visiting a patient at home and need to know the risk of aspirin aggravating asthma

Sometimes we can postpone seeking the answer till the consultation is over. We can look it up between patients or later, and write the answer in the notes. Often, however, the answer is critical to further action and cannot be postponed—and the patient probably knows it. The choice then lies between local print resources (books, journals, reprints), asking a colleague, and using a computer. Table 2 shows the commonest sources used by Ely's 103 family doctors to answer the 444 clinical questions they pursued, how long they spent seeking answers, and their success rates[4].

Wall posters were the fastest source and were usually helpful; but, probably because they can hold only a few pages-worth of information, they were seldom used. Calling a peer and looking up drug information in a book had high success rates and access times were acceptable at about 1 minute. Looking up other information in books or articles took 20 seconds longer than drug information and was less successful but was one of the most frequently used methods, presumably because books cover a very wide range of information. Finally, computers usually failed to provide the answer and took three times as long. This is doubtless why they were seldom used.

Instant clinical reference books

Factors that make a book suitable for instant reference include logical organization and indexing and judicious layout[8]. Familiarity also makes a big difference as it helps us to remember whether the information is there at all and where to find it. Obviously, the factual content of a clinical reference book should be as up-to-date and evidence-based as possible. When textbooks and review articles are written in the traditional way, several years can elapse before incorporation of clear evidence from primary studies[9]; thus, many authors and editors now conduct systematic literature searches to ensure that nothing important has been omitted. A good example is the *Clinical Evidence* series[10], which provides evidence-based answers to clinical questions. These answers depend on exhaustive literature searches updated every 6 months, with predefined methods for selecting, extracting and combining evidence[11]. A clinical reference book which still uses the informal approach but is well organized, comprehensively indexed and regularly updated is the *British National Formulary*.

Of course, books are of no value if they are out of date or missing from your shelf or library. The broader issues of selecting and maintaining a collection of books or multimedia are addressed in the next article in this series.

Discussion with peers

Talking with a colleague often seems the best option when we are uncertain what to do, but a study of clinical communications in a Bristol hospital showed that many of the phone calls were unsuccessful attempts to locate the right person[12]; the moral is that organizations should

Table 1 **The elements of a well-formed question**

Clinical dilemma	***Possible clinical goals***	***Options being considered***	***Relevant patient data***
Diagnosis	To select a test, select a therapy, identify a side-effect, give a prognosis, write a legal report . . .	Candidate diseases or complications of therapy . . .	Clinical and laboratory findings; past history and therapy
Choice of investigation	Disease staging, prognosis, monitoring therapy, patient reassurance . . .	No testing; list of tests and diseases to be distinguished . . .	Diagnosis, clinical findings, drugs; past test results; patient utilities and aversion to risk
Referral plan	Further investigation, access to restricted therapy, second opinion, social care . . .	No referral; to a peer in same institution; to another general hospital or tertiary centre; inpatient or outpatient . . .	Unexplained features, disease progression, previous therapy, patient dissatisfaction, social circumstances
Prognosis	To change or withdraw therapy, order further tests, counselling, reassurance . . .	Precise figure or rough prognosis (same, worse, or better than before)	Disease and stage, findings, test results; reason for patient's request for information
Choice of therapy	To prevent or cure; symptom control . . .	No treatment; names of treatment options; treatment regimens	Disease and stage; past therapies; allergies; patient tolerance of side-effects, risk, needles . . .
Follow-up schedule	Change of therapy, review of disease progress, review of test results, reassurance	No follow-up; where and how frequently to follow-up	Diagnosis; stage and stability of disease; patient self-care ability; duration of therapy; time till test results available . . .

Table 2 **Sources used by Ely's 103 family doctors to answer 444 questions, how long they spent seeking answers, and their success rate**

Information source used	***Per cent (number) of questions pursued***	***Median time spent seeking answers***	***Success rate of searches***
Peer: doctor, pharmacist, etc.	36% (161)	1 min 8 s	79%
Non-drug books, articles	32% (143)	1 min 10 s	52%
Drug texts	25% (113)	50 s	85%
Wall posters	4% (17)	35 s	82%
Computer databases, Internet, etc.	2% (10)	3 min	20%

Data from Ely *et al*. (Ref 4)

improve their phone directories. Voicemail has perhaps made matters worse, but mobile phones should improve communication.

Even if we do succeed in making such contact, discussions of this sort have disadvantages: peers expect us to remember their answers, resent interruptions during cardiac bypass procedures or ward rounds, may expect favours in return and prefer not to be disturbed from 10 pm to 8 am (when many clinically important questions arise). Some peers are displeased when we do not take their advice or call someone else. Often we must compromise between talking to the most appropriate person and the most available person—the professor of neurosurgery, for instance, versus a colleague next door. A third alternative is to consult an information service that helps refine a question, search for the answer and return a summary within a few hours; several now exist around the UK (R Stamp, personal communication).

Studies of the behaviour of large communities of doctors[13] have shown that there is usually a small core of 'opinion leaders' who field most of the difficult clinical questions. These are often the clinicians who engage in teaching and research, travel to conferences and keep in touch with the published work. Such networks can be formalized by providing telephone help lines manned 24 hours a day[13]; however, since these same opinion leaders often sit on guidelines committees, one can also access their wisdom indirectly. Guidelines can be useful in answering routine clinical questions, but you may have difficulty in finding the ones you need[14], in resolving differences

between them[15] and in checking which part refers to the current clinical dilemma. Guidelines are discussed in the third article in this series.

Instant access to computers

Table 2 shows that, regrettably, computers are not yet the ideal way to get satisfactory and speedy answers to clinical questions. Clinicians in Ely's study sought computer-based information in only 10 (2%) of the 444 questions they tackled[4]. Further evidence of low usage rates for electronic information resources comes from a systematic review[6] showing rates of between 0.3 and 6.7 per month for practising US doctors. It is noteworthy that doctors used Medline to answer two-thirds of their questions when electronic textbooks and full-text journals were also available[6]. Even with the help of an experienced librarian, Medline is helpful in only half of primary care dilemmas[16]; this suggests either that the doctors needed training in this respect or that their questions were often related to research rather than practice.

Thus, despite the predictions of Lawrence Weed, with his 'problem-knowledge coupling' software[17], and Sackett's pioneering work with a computer on teaching rounds[7], paper still seems to win hands down. Doctors should not be reluctant to use computers because of patient anxiety. Johnson *et al.* found that patients were more satisfied with a consultation if the doctor, when in doubt, used a computer rather than a book[18]. Doctors' reluctance to use computers may stem from difficulty in finding high-quality material[19], limited clinical computing skills or poor access to networked computers in the clinic or at the bedside. For a lucky few this will change soon with portable cellular Internet phones, if the limitations of battery life and screen size can be resolved. The benefits of their introduction throughout the National Health Service will need to be studied rigorously in view of the high cost of the devices and the supporting infrastructure. A cheaper first stage would be to provide one or two suitable fixed computers in every clinic or ward. Sackett concluded from timing trials at the John Radcliffe hospital that clinicians could use a computer in a side-room to answer sixteen questions in the time taken to consult a reserved machine in the library just four floors away[7].

Increasing emphasis on in-service training, clinical governance and the wider use of evidence, as well as the announcement of a National Electronic Library of Health[20], means that every NHS ward, clinic or general practice will need ready access to a local computer offering information resources. It will be up to the medical profession to ensure that, subject to proven efficacy, this is followed by widespread adoption of portable devices, as foreseen a decade ago[21].

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