

ABC of health informatics

How decision support tools help define clinical problems

Frank Sullivan, Jeremy C Wyatt

The patient, Mr Evans, presented with headaches and early morning waking (dealt with in article of 24 September) as the main reason for his consultation. This article, however, discusses how informatics resources can be used to consider issues other than the presenting problem. The Stott and Davies model of the consultation indicates that three other areas of the interaction should be considered.

- Management of continuing problems—The patient's diabetes may be contributing to the overall picture.
- Opportunistic health promotion—Ask screening questions about alcohol use and measure the patient's blood pressure.
- Modification of help seeking behaviours—Discuss issues relevant to self care and when to attend for health checks for established or potential problems.

Management of continuing problems

Awareness of problems

Sometimes doctors and patients are not aware of relevant problems. Issues that are apparent to one person may not be apparent to the other. In Mr Evans's case the diabetes is known to doctor and patient. The alcohol problem is, perhaps dimly, apparent to Mr Evans. The high blood pressure reading is something that only the doctor is aware of initially. Neither doctor nor patient is aware of the depression at the beginning of the consultation, but information conveyed before, or during, the consultation may alter that.

When a health professional realises that he or she is aware of an issue that the patient is not, the matter can be remedied. It is more difficult if the patient is aware of an issue that is relevant, but is unwilling to divulge it. Even more difficult is a situation where neither patient nor doctor is aware of a problem that may be relevant to the patient's problems (see Johari Window). Electronic prompts to bring up such hidden issues are being incorporated into clinical systems, and are increasingly effective.

Problems underlying depression

Depression is common and often associated with anxiety, cognitive impairment, and substance misuse.

It is important to detect alcohol misuse because failure to do so may mean that treatment for the presenting problem is ineffective. Several screening tools with different characteristics for various clinical settings are available. When the CAGE questionnaire is used on its own in primary care, a positive response to two or more items on it has a sensitivity of 93% and a specificity of 76%. Different questionnaire screening tests for alcohol misuse, such as the fast alcohol screening test (FAST), may detect problems at an early stage, when intervention may be more effective than later on. Other clues can help the doctor, including comments from family members and the nature of past consultations—for example, injuries that were only partially explained.

When the baseline probability of a condition and the odds ratio of a modifying factor are known, then the effect of any new information can be calculated by using Bayes' nomogram. Unfortunately, key items of information needed for such calculations are often unavailable. For the foreseeable future, interpreting the results of most investigations still relies heavily

This is the fourth in a series of 12 articles
A glossary of terms is available at <http://bmj.com/cgi/content/full/331/7516/566/DC1>

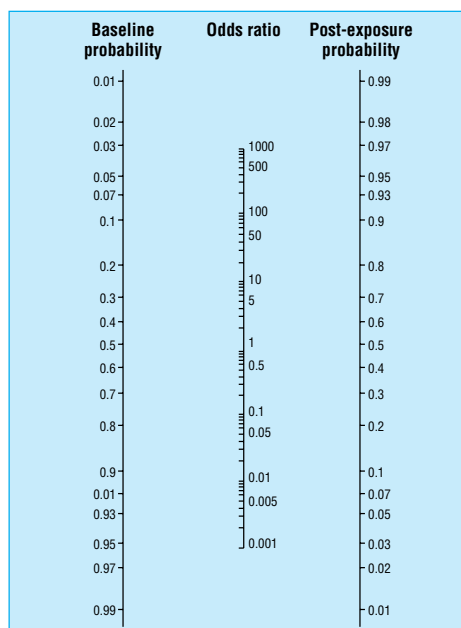
Mr Evans is a 49 year old, recently unemployed, pharmaceutical company representative who has presented with low mood, poor appetite, and sleep disturbance. He drinks two bottles of whisky per week, but he does not volunteer this information initially. He has type 2 diabetes. A blood pressure check shows 178/114 mm Hg, and Mr Evans is asked to return to the practice nurse for follow-up

Management of presenting problems	Modification of help seeking behaviours
Management of continuing problems	Opportunistic health promotion

Exceptional potential in each consultation. Adapted from Stott NCH, Davies RH. *J Roy Coll Gen Pract* 1979;29:201-5

	Known to patient	Not known to patient
Known to clinician	Open	Blind
Not known to clinician	Hidden	Unknown

The Johari Window shows situations where one or both individuals in the consultation may not be aware of all the relevant information



When estimates of the odds ratio and baseline probability are known, Bayes' nomogram can be used to calculate post-exposure probability

on (according to Feinstein) “the judgements of thoughtful people who are familiar with the total realities of human ailments.”

Apart from depression, there are other situations in which harmful alcohol use may be important, and an electronic alert may be useful in a consultation. Although it is not the main reason for consulting, Mr Evans also has type 2 diabetes and today’s consultation is an opportunity to deliver proactive care.

Problems complicating diabetes

The microvascular and macrovascular complications of type 2 diabetes need to be monitored regularly. Guidelines are incorporated into local clinical governance structures to ensure that all necessary care is given to patients. Organisations are responsible for providing different elements of the care recorded in electronic patient records. Integrated services (such as health maintenance organisations or the managed clinical network) share responsibilities, using electronic health records across primary, secondary, and tertiary care.

Mr Evans’s only abnormal physical test result is a blood pressure of 178/114 mm Hg. The raised blood pressure is potentially important, and the practice’s decision support software gives advice on what to do next. Most of the advice on checking for secondary causes of hypertension (such as excessive alcohol ingestion and end organ damage) is familiar to the doctor, as is the advice to repeat the examination on several occasions before starting treatment. Grade 1 evidence from meta-analyses or large randomised controlled trials may be available for straightforward clinical problems (for example, starting antihypertensive drugs), but this is not always the case.

Clinical decision support tools are being refined to provide the information that clinicians require without overloading them with unnecessary data. This is difficult as the amount of information needed and the sources from which information is obtained varies.

Guidelines

Field and Lohr describe clinical practice guidelines as “systematically developed statements to assist practitioners and patient decisions about appropriate health care for specific circumstances.” One role of guidelines is to ensure that all relevant issues are dealt with during clinical encounters. Individual guideline organisations have their own websites and other organisations, such as the Turning Research into Practice (TRIP) database, integrate several guideline sources and other evidence based resources.

Computerised guidelines provide evidence based recommendations for, and can automatically generate recommendations about, the screening, diagnostic, or therapeutic activities that are suggested for a specific patient. The advantages of computerised guidelines over written guidelines are that they:

- Provide readily accessible references and allow access to knowledge in guidelines that have been selected for use in a specific clinical context
- Show errors or anachronisms in the content of a guideline
- Often improve the clarity of a guideline
- Can be tailored to a patient’s clinical state
- Propose timely decision support that is specific for the patient
- Send reminders.

Knowledge from unfamiliar sources

In the post-genomic world, clinicians will have to integrate their understanding of patients’ phenotype with new information

Highest scoring diabetes indicators in UK GP Quality and Outcomes Framework 2004*

Indicator	Points	Maximum threshold
<i>Records</i>		
Practice can produce a register of all patients with diabetes mellitus	6	
<i>Ongoing management</i>		
Percentage of patients with diabetes in whom the last HbA1c is 7.4 or less (or equivalent test/reference range depending on local laboratory) in past 15 months	16	50%
Percentage of patients with diabetes in whom the last HbA1c is 10 or less (or equivalent test or reference range depending on local laboratory) in past 15 months	11	85%
Percentage of patients with diabetes who have a record of retinal screening in the previous 15 months	5	90%
Percentage of patients with diabetes in whom the last blood pressure is 145/85 mm Hg or less	17	55%
Percentage of patients with diabetes whose last measured total cholesterol within previous 15 months is 5 or less	6	60%

*In total, 1050 quality points are available, of which 550 points are for clinical targets. The most important areas are coronary heart disease, hypertension, and diabetes, which account for 325 (59%) of the 550 points for clinical indicators

Revised grading system for recommendations in evidence based guidelines*

Levels of evidence

- 1++ High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
- 1+ Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
- 1– Meta-analyses, systematic reviews or RCTs, or RCTs with a high risk of bias
- 2++ High quality systematic reviews of case-control or cohort studies or high quality case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal
- 2+ Well conducted case-control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal
- 2– Case-control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal
- 3 Non-analytic studies—for example, case reports, case series
- 4 Expert opinion

Grades of recommendations

- A At least one meta-analysis, systematic review, or RCT rated as 1++ and directly applicable to the target population or A systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+ directly applicable to the target population and demonstrating overall consistency of results
- B A body of evidence including studies rated as 2++ directly applicable to the target population and demonstrating overall consistency of results or Extrapolated evidence from studies rated as 1++ or 1+
- C A body of evidence including studies rated as 2+ directly applicable to the target population and demonstrating overall consistency of results or Extrapolated evidence from studies rated as 2++
- D Evidence level 3 or 4 or Extrapolated evidence from studies rated as 2+

*Guidelines of the Scottish Intercollegiate Guidelines Network Grading Review Group. RCT = randomised controlled trial

from genomics, proteomics, and metabonomics. These new modes of inquiry about patients' underlying genetic status help to explain older, empirical observations. For example, the relative ineffectiveness of aspirin in preventing thromboembolic disorders in 25% of the population may be caused by several common gene variants that affect platelet glycoprotein function. The challenge to clinicians is to integrate this new knowledge into their diagnostic and therapeutic approaches during consultations.

Modifying help seeking behaviours

Some patients with long term health problems do not attend review appointments. This is a particular problem when the individual has multiple comorbidities. A patient with depression may not think it is worthwhile spending scarce health service resources on themselves because they have low self esteem, which is often associated with depression. Electronic patient records summarise health problems and, potentially, prompt when reviews have not been undertaken. Some services, like review of the patient's self monitoring, can be provided immediately. Others, such as retinopathy screening, may have to be scheduled for another date and place. An electronic health record shared between colleagues in different professions and parts of the health services makes scheduling easier.

Electronic clinical information systems

The principal function of electronic clinical information systems is to facilitate patient care. This involves identifying, classifying, understanding, and resolving problems to the satisfaction of the patients. Clinical records are also required to recall observations, to inform others, to instruct students, to gain knowledge, to monitor performance, and to justify intervention. Electronic clinical information systems are becoming integral components of healthcare services, and in many industrialised countries they are replacing the established paper based system of records. Combining the electronic patient records of different organisations creates a single electronic health record. The challenge for many health services is to provide "cradle to grave" information. Effective integration of records depends on establishing a workable unique patient identification system such as the community health index.

Summary

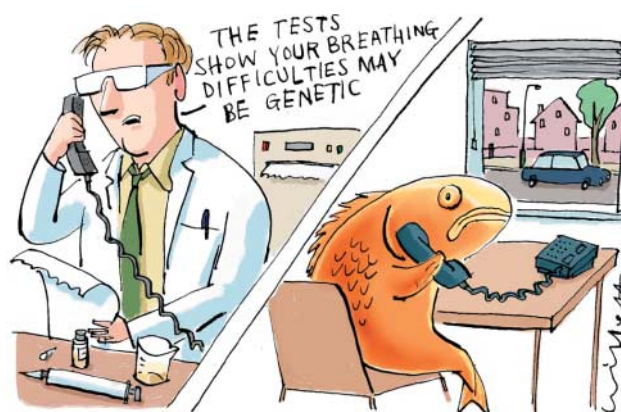
Individuals in most industrial societies who are, or believe themselves to be, ill can turn to a variety of sources of advice other than health professionals. However, these sources will probably only help with the problems that a person deals with that day. A doctor is often needed to provide additional information, and to interpret and individualise advice for all the problems brought to the consultation by the patient, not just the presenting problem.

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Definitions

- Electronic patient record—Records the periodic care provided mainly by one institution. Typically, this information will relate to the health care given to a patient by an acute hospital
- Electronic health record—A longitudinal record of patients' health and health care: from cradle to grave. It combines the information about patient contacts with primary health care as well as subsets of information associated with the outcomes of periodic care held in the electronic patient record

Further reading

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