

ABC of health informatics

How informatics tools help deal with patients' problems

Frank Sullivan, Jeremy C Wyatt

During the everyday general practice consultation described in the box opposite, the common and rare collide. A problem that may have been a routine matter becomes one of enormous importance to the doctor and the patient. At least seven problems should be dealt with during the consultation. This article, which follows on from the initial contact between Dr McKay and Ms Smith described in the first article of the series (*BMJ* 2005;331:566-8), explains how a range of solutions may be presented to doctors during the consultation to augment their decision making processes.

Presenting problems

Ms Smith came to see her GP because of tiredness and muscle cramps, and these problems need to be considered in detail. Potential solutions should be discussed with Ms Smith in a way that she can understand.

The patient's history indicated that, among other things, her pulse should be taken and her blood pressure measured. The abnormal physical findings recorded in the electronic notes were pallor and a blood pressure of 178/114 mm Hg. The raised blood pressure was a potentially important new finding, and the practice's decision support software gave advice on what to do next. Most of the advice on checking for secondary causes of hypertension and end organ damage was familiar to Dr McKay, as was the recommendation on PRODIGY (Prescribing RatiOnally with Decision Support) to repeat the examination on several occasions before starting treatment.

The rest of this article describes Ms Smith's return visit, when several blood pressure recordings and routine biochemistry test results were available to Dr McKay. Clinical decision support tools are being refined to provide the knowledge that doctors need without overloading them with unnecessary advice. This goal may be difficult to achieve because the amount of information needed varies between health professionals and clinical situations.

Investigation

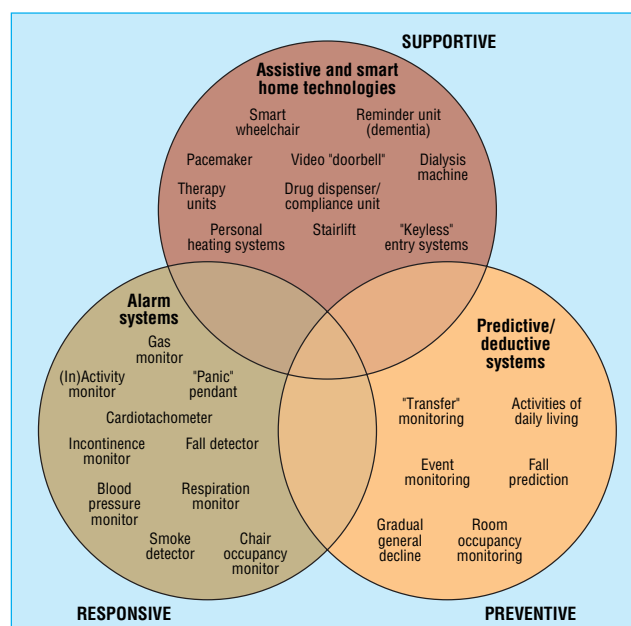
Four hours after the practice nurse had sent the patient's blood for testing, the results arrived by email. Ms Smith's result had been flagged red, and so Dr McKay opened up the details and saw that she had substantial renal impairment, hyperkalaemia, and hypercalcaemia of sufficient severity to explain her presenting symptoms. Having laboratory test results available on the same day the tests are done can reduce delays in starting treatment. An urgent phone call or email from the laboratory may be preferred for extremely abnormal results, like a serum potassium 6.7 mmol/l.

Ambulatory blood pressure readings can be made available through telemetry or at the patient's next visit to determine whether there is a sustained rise in blood pressure. An increasing number of biometric sensing devices can provide information to help with the decision making process.

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

Ms Smith is a 58 year old florist with a 15 year history of renal impairment caused by childhood pyelonephritis. She has tiredness and muscle cramps. She consulted her general practitioner (GP), Dr McKay, three days ago. Dr McKay noted Ms Smith's blood pressure was 178/114 mm Hg, and she asked her to visit the practice nurse (who could repeat Ms Smith's blood pressure test) to check her urinalysis and send off blood for laboratory tests. The results of the blood tests show serum potassium 5.2 mmol/l, serum calcium 2.8 mmol/l with albumin 38 g/l, and creatinine 567 µmol/l

Decision support for hypertension



A wide range of sensing devices are available and can be broadly categorised

Referral

At the next visit Dr McKay tells Ms Smith that she should start treatment for hypertension and hypercalcaemia. Dr McKay also says that Ms Smith should be referred to a renal physician, Dr Jones, and a community dietitian for further assessment. Ms Smith agrees, and Dr McKay telephones the hospital to discuss these matters during the consultation. Dr McKay then uses an electronic referral form on the hospital outpatient booking website to provide the information required by colleagues at the local hospital. In some contexts, this final task can be done using an electronic booking programme. Health maintenance organisations in the United States, which provide integrated primary and secondary care, book appointments electronically, and the ability to do this is a priority in the United Kingdom. Booking appointments electronically in more complex referral settings is difficult. The problem is not a technical one—rather, political and workflow difficulties make transfer of meaningful data between different parts of a health service hard to achieve.

My Medical Practice

Telephone:	Fax:	Appointments:
REFERRAL LETTER - Medical in Confidence -		
REFERRAL TO:		
Clinic: \$Clinic\$	\$Hospital\$	
Speciality: \$Speciality\$	\$Hospital Address\$	
Consultant: \$Specialist\$	\$Hospital Postcode\$	
URGENCY OF REFERRAL:		
\$Urgency\$	\$Urgency Reason\$	
PATIENT DETAILS:		
Name: \$Surname\$		\$Address\$
First Name: \$First Names\$		\$Postcode\$
Title: \$Title\$		
Sex: \$Sex\$		
Date of Birth: \$DOB\$		
CHI No: \$CHIS\$	Tel: \$Telephone\$	
Registered GP: \$RegGPName\$ (\$RegGPCyber\$)		
History of Presenting Complaint		
\$History\$		

An electronic referral form can be filled in by GPs so that the hospital has all the necessary details of the patient

“Just in time” learning

Dr McKay had missed an issue of the *BMJ* in which it was reported that blood pressures taken during consultations are often inaccurate. However, the article in question had loaded automatically into the *Clinical Evidence* folders of the file storage on her Palmtop computer. Alternatively, the article could be held on a laptop computer, mobile phone, or in a secure personal web file to allow remote access.

This new knowledge was available to Dr McKay during the first consultation, and she asked the practice nurse to arrange ambulatory blood pressure testing. This is an example of a “push technology,” which makes information available when and where it is needed—just in time. When an interest is registered in clinical topics relevant to a practice, selected and relevant information can be sent to the practice by email, or mobile phone text messages or downloads, at daily or weekly intervals, or less often. Most doctors, whether in hospital or the community, are rarely in one place for long. The information systems they use to support their work need to be as mobile as they are. Technological advances allow doctors to access data and knowledge when connected to a fixed source like a CD Rom of their favourite book or by wireless connection to the internet.

Accessing information after the consultation

At the end of the consultation Dr McKay emails Ms Smith the address of a good website containing information aimed at patients so that she can access it from home, a public library, or an internet cafe. The availability of high quality resources for patients mitigates potentially alarming messages on less scrupulous websites that may, for example, say that high blood pressure is often caused by mercury poisoning from dental fillings.

Most GPs accept that patient education is an important consultation task. They may be sceptical about whether patients take their advice on smoking and exercise, but doctors continue to tailor advice to patients because specific information does improve knowledge and reduces any conflict that might arise during decision making. Educating patients need not be limited by short consultation times.

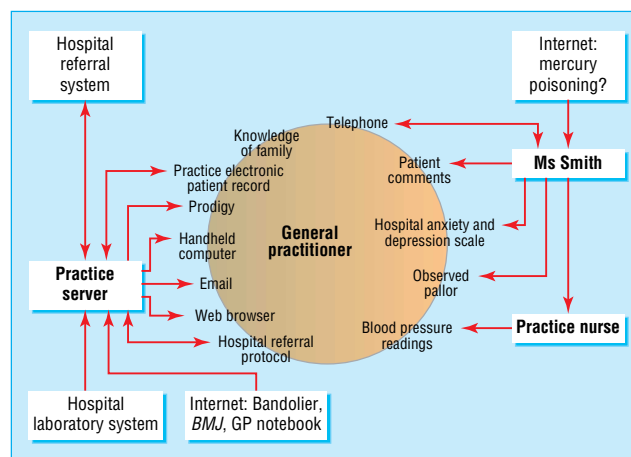
Reasons for using handheld computers at the point of care in the United States in 2003

- To access drug information—67%
- To access clinical decision support—22%
- To prescribe drugs—13%
- To access medical records—4%
- To view laboratory results—3%

High quality information portals for patients

- www.nhsdirect.nhs.uk
- www.patient.co.uk
- www.omni.ac.uk
- www.noah-health.org/en/rights

See also: Potts HWW; Wyatt JC. Survey of doctors' experience of patients using the internet. *J Med Internet Res* 2002. www.jmir.org/2002/1/e5/



Information used during and around the consultation

Summary

This episode of care illustrates many of the features of medicine in the information age. People in industrial societies who are, or believe themselves to be, ill can turn to a variety of sources of advice other than health professionals. In most cases these resources, personal knowledge, and advice from family and friends will be enough for people to resolve their health problems. In other cases, the information they obtain will be insufficient or misleading. A primary care clinician is often needed to provide additional information, interpret it, and individualise advice for each of the problems brought to the consultation by the patient. A few patients may seem reluctant to seek information or participate in decisions about treatment options. They prefer being told what to do, but even these patients usually appreciate a paper leaflet or website address that they can give to family or friends who are more enquiring.

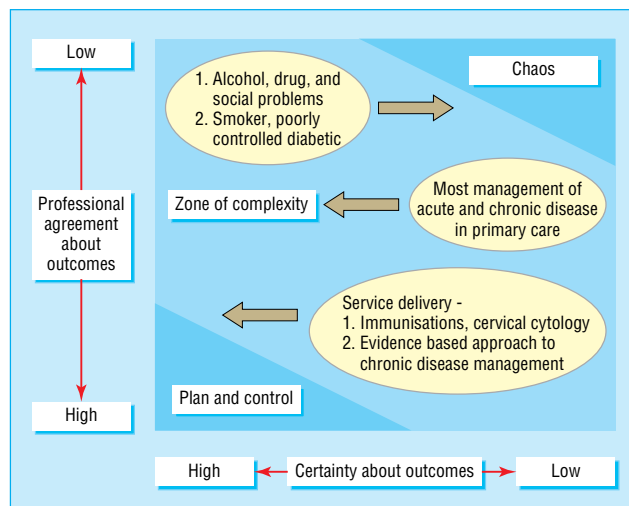
In this example, some of the problems that had to be dealt with included Ms Smith's presenting problems (tiredness and muscle cramps); opportunistic health promotion (screening for anxiety and depression), managing ongoing problems (metabolic upset and hypertension caused by chronic pyelonephritis), and modifying help seeking behaviours (easing the patient's uncertainty over electronic information sources).

Dr McKay had to decide on and undertake seven actions during this consultation.

- Explaining the cause of the patient's symptoms and available treatments in a way that Ms Smith could understand
- Assuaging the patient's anxiety that she may have mercury poisoning
- Starting treatment for hypertension with a thiazide
- Starting treatment for hypercalcaemia with bisphosphonates
- Referring Ms Smith to a consultant nephrologist
- Referring Ms Smith to a community dietitian
- Advising the patient on use of internet resources to obtain more information

Fortunately, clinicians in primary care teams no longer need to rely on memories of lectures or their old medical textbooks. Better informed patients, medical records that inform and teach, and electronic sources of reliable, well presented information make it easier to make informed decisions on problems presented in primary care. Informatics tools are generally less helpful in more complex situations, in which there may be uncertainty about the outcomes of interventions or no professional consensus on the value of the outcomes that are achievable.

Better decisions in primary care should lead to more appropriate referrals to secondary care and a more efficient health service. Research on the information needs of primary care clinicians is informing the development of information services. Educational research is starting to show how to meet those educational needs most effectively and in a manner congruent with professional revalidation.



Certainty and professional agreement on clinical decision making. Adapted from Hassey A. Complexity and the clinical encounter. In Sweeney K, Griffiths F (eds). *Complexity and healthcare: and introduction* Oxford: Radcliffe Medical Press, 2002

Further reading

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