Controversies in management

Should general practitioners perform diagnostic tests on patients before prescribing antibiotics?

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As most antibiotics are prescribed by general practitioners, control of antibiotic resistance depends greatly on rational prescribing behaviour by these doctors. Here a Danish microbiologist argues for near patient testing before prescribing antibiotics, while a British general practitioner contends that there are considerable problems associated with testing and that time is often the best treatment for acute, self limiting infections.

FOR As 80% of antibiotics are prescribed by general practitioners,¹ control of antibiotic resistance depends greatly on rational prescribing behaviour in this group of doctors. Microbiological testing is an important tool in rational prescribing of antibiotics, not only in hospitals but also in general practice. However, the usefulness of laboratory based testing may be limited if it takes too long—particularly in patients who are considered to need immediate antibiotic treatment. These patients will therefore be treated empirically, and test results received afterwards from the laboratory may have little influence on the course of treatment.

One way of overcoming these problems is to perform near patient microbiological testing. In Denmark, many general practitioners undertake selected microbiological tests using phase contrast microscopy and simple diagnostic kits.^{2,3}

Advantages of near patient testing

Practice based microbiological testing has several advantages. Most importantly, the test result can be available immediately, and this helps to decide whether the patient should be prescribed antibiotics. General practitioners are often under pressure from patients who believe they need antibiotics.⁴ With a negative test result at hand it is much easier for the doctor to refuse to prescribe an unnecessary antibiotic. Furthermore, if the patient needs treatment immediately, the test result may help in choosing the most appropriate agent.

Near patient testing also reduces bureaucracy. General practitioners do not have to spend time filling in the forms that have to accompany specimens sent to the laboratory, communication problems with the laboratory are obviated, and money spent on

envelopes and postage can be saved. This suggests that practice based testing will often be cheaper than laboratory based testing. Last, but not least, practice based testing may increase the satisfaction the doctor gains from working with his or her patients.

Quality issues

The standard of testing in general practice must be comparable to that in the microbiology laboratory. This imperative limits the types of tests that can be performed in general practice—only simple, rapid, and reliable tests are suitable. Furthermore, test results must be easy to read, and their clinical interpretation must be unequivocal. Tests that do not meet these requirements are unsuitable for the pressurised working conditions of general practice, where only a short time is set aside for each patient. In addition, a given test must be performed frequently, and the positive rate must be sufficiently high that a positive result is seen regularly. If these requirements are not met, the general practitioner will never develop enough experience, and the quality of testing will be unsatisfactory.

The table shows the more important microbiological tests which, according to the above principles, are suitable for general practice. Some of these tests are performed with commercial diagnostic kits, but the most important diagnostic tool is a good microscope. It must have phase contrast—this allows microscopy to be carried out on unstained material, which simplifies the preparation of slides and saves time.

Important near patient tests

The most important microbiological tests carried out in general practice are those for vaginal discharge,

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Microbiological tests suitable for near patient testing in general practice

Disorder	Test method	Test principle
Urinary tract infection	Phase contrast microscopy of fresh voided uncentrifuged urine	Detects bacteria and leucocytes
	Test strips	Nitrite plus leucocyte esterase
	Kits based on dip slide technique	Urine culture
Vaginitis/vaginosis	Phase contrast microscopy of vaginal and cervical secretion obtained by gynaecological examination	Detects yeasts (pseudomycelia and budding cells), trichomonas, and clue cells in vaginal discharge
Pharyngotonsillitis	Enzyme immunoassay kits that detect group A streptococcus antigen in throat swabs	Detects group A streptococcus antigen in pharyngeal exudate
Dermatophytoses	Phase contrast microscopy of scrapings treated with potassium hydroxide	Detects fungal mycelia in scrapings from skin and nails
Perianal pruritus	Phase contrast microscopy of Sellotape imprints from the perianal area	Detects eggs of pinworms in the perianal area
Mononucleosis	Microscopy of blood smears stained with Giemsa	Detects McKinley cells in peripheral blood

dysuria, and sore throat. Vaginal discharge is one of the most common problems about which women consult their general practitioner. Comparative studies have shown that examination of a vaginal smear by phase contrast microscopy in the general practitioner's surgery gives a much more precise diagnosis than cultures performed in the microbiology laboratory.⁵ This technique can also be used to validate the quality of cervical smears sent for cytology screening.

■ *"The most important diagnostic tool is a good microscope"*

Urine microscopy is excellent for detecting urinary tract infection. In experienced hands, it is as rapid as using urine test strips, and more informative. Furthermore, urine microscopy may help to identify patients in whom culture is indicated and those for whom other kinds of investigation—for example, chlamydia testing or examination for atrophic vaginitis—should be considered.

Using diagnostic kits to detect group A streptococcal antigen is a much more precise way of identifying streptococcal tonsillitis than clinical criteria alone.

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AGAINST The use of tests in diagnosing medical problems is fundamental to medical training from the earliest stages. In acute infection, near patient testing to target antibiotics at those patients who are most likely to benefit seems a logical way of rationalising antibiotic prescribing. However, several aspects of diagnostic testing in general practice still need to be assessed critically before its value can be judged.

Are tests feasible and valid?

The commonest acute infections managed by general practitioners are those of the respiratory system (acute sore throat, acute cough or bronchitis, acute red ear or otitis media, acute sinusitis) and the urinary tract.^{1 2} Near patient testing for microbiological diagnosis is currently not feasible in routine settings for sinusitis and acute otitis media without perforation,^{3 4} and is not useful for acute cough.⁵ I will therefore focus on acute sore throat and acute urinary tract infection.

Group A streptococci are the only well recognised cause of bacterial tonsillitis, and they are still uniformly susceptible to penicillin. Culture is therefore indicated only in patients with recurrent infection, in whom other organisms may occasionally play an aetiological part.

Training and quality assurance

Practice based testing calls for education and quality control. In particular, courses in microscopy are needed. In Denmark, general practitioners and clinical microbiologists have worked together for several years to develop courses in microscopy for beginners and more experienced operators. Quality assurance for tests to detect group A streptococcus antigen and other commercial kits is important because these can be sold in most countries without any official licence. Clinical performance studies of diagnostic kits for detecting group A streptococcal antigen marketed in Denmark show that the quality of these may vary appreciably.⁶ As decentralised microbiological testing becomes more common the need for formalised quality assurance programmes will grow. Microbiology laboratories must undertake this task, if necessary in collaboration with other laboratory specialities such as clinical biochemistry.—Hans Jørn Kolmos

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The proposed standard diagnostic tests for acute sore throat are the throat swab or rapid test to detect group A β haemolytic streptococcus antigen.⁶ However, the throat swab does not differentiate between infection and carriage, and community studies have shown that its sensitivity, specificity, and positive predictive value are disappointing compared with the antistreptolysin-O test.^{6 7}

Although examination of a midstream specimen of urine remains the standard investigation for acute urinary tract infection, debate continues about the cut off point that represents infection.⁸ In practice, most general practitioners do not have the time, resources, or expertise to perform their own microscopy and culture of midstream specimens of urine, and the diagnostic delay that occurs with laboratory testing limits the clinical usefulness. Urinary reagent test strips may be a feasible alternative, but the quality of studies assessing their use is poor. Few studies have been performed in primary care (RA Moore et al, personal communication), and preliminary evidence

shows that test strips may not perform much better than clinical scoring methods.⁹ There is also evidence that the performance of reagent test strips is reduced in everyday conditions.¹⁰ This illustrates the general concern over the validity and effectiveness in daily practice of near patient testing.¹¹

Can tests hasten recovery?

Even assuming that valid tests were available, does better diagnosis lead to an appreciable health gain? Both acute sore throat and acute urinary tract infection are short and self limiting conditions, and the need to diagnose the causal organism is therefore questionable. Although targeting treatment for sore throats at streptococcus may reduce the duration of symptoms by 20-30%,¹²⁻¹³ estimates from three trials suggest that recurrence is also increased by 20%, which probably negates any benefit of more rapid symptom resolution.¹⁴

With regard to acute urinary tract infection, the usefulness of a definitive diagnosis may also be questionable.¹⁵ Symptoms in 50% of patients with bacteriuria will probably resolve within three days without antibiotic treatment, and reasonable alternative treatments exist.¹⁵⁻¹⁶

Can tests prevent complications?

It is usually assumed that bacterial infections are more likely to lead to complications and should therefore be targeted preferentially. However, viral infections are more common,⁶ and complications may also result from secondary bacterial complications of primary viral infections. Since there are few data about complications, we in primary care have little idea whether better microbiological diagnosis is the key or whether it is more important to identify clinical or socio-demographic subgroups who are at risk. Since complications are rare, large prospective cohorts will be needed to generate unbiased clinical and microbiological data. In the meantime, if we make the generous assumption that every complication is preventable, we would have to test hundreds of people to prevent even the most common non-life threatening complications such as quinsy.¹⁷

Is there net patient benefit?

Showing that a better diagnostic test is available is not enough—the test has to be seen to produce an appreciable health gain. Even using rapid tests, general practitioners changed their prescribing decisions in only 13% of cases, thus questioning the net health gain from better diagnostic tests.¹⁸ Rapid access to diagnostic tests for respiratory illness has not reduced antibiotic prescribing.¹⁹ Randomised trials of the use of diagnostic tests and other diagnostic strategies in self limiting conditions are needed before their widespread use is advocated.

Are tests cost effective?

Health service resources are scarce. A throat swab or midstream sample of urine costs £5-£7 per test, and using diagnostic tests will increase health service costs greatly, with little evidence of any health gain. The use

of rapid tests or urinary test strips is not likely to reduce antibiotic prescribing costs for those general practitioners who are low prescribers of these drugs, but could reduce costs for high prescribers if other health service costs were not increased.⁹

Could using diagnostic tests increase other costs? More testing will increase the number of patients with false positive results and will probably increase the psychological costs.²⁰ Greater use of diagnostic tests will probably increase spending on secondary care.²¹ Furthermore, the doctor's behaviour during the consultation can increase the expectations of patients and their belief in the importance of seeing the doctor. Given the central importance of patients' expectations in determining the behaviour of doctors,²² clarification of the effect of diagnostic tests on the subsequent expectations of patients is crucial. With regard to sore throat, there is preliminary evidence from a large randomised controlled trial that the prescribing of antibiotics by doctors increases patients' expectations. By increasing belief in the importance of antibiotics and increasing reattendance by 40%, the prescribing of antibiotics "medicalises" a self limiting illness and increases health service costs.¹⁴⁻¹⁷

■ *"Rapid access to diagnostic tests for respiratory illness has not reduced antibiotic prescribing"*

Although there is little evidence on the medicalising effect of performing diagnostic investigations, this probably creates the perception that it is important to see the doctor to have the test. Indeed, there are reports from countries where diagnostic testing for sore throat is widespread (for example, Denmark) that patients expect to have a diagnostic test (J Lous, personal communication). Thus, a major cost of diagnostic testing may be that it encourages rather than reduces the expectations which patients with self limiting illness have of their doctor. Diagnostic testing may encourage more patients to visit their general practitioner. If more people see their doctor, net antibiotic use would not be reduced, and the selective pressure favouring the development of antibiotic resistance would continue.²³⁻²⁴ Before advocating a major change in use of resources towards increased diagnostic testing, we need to be clearer that the benefits exceed the costs and that this is the most cost effective use of funds.

Conclusion

Diagnostic tests for acute infections should be used where there is clear evidence of validity, feasibility, and cost effective health gain—including the effects on patients' expectations and on net use of antibiotics. With current concerns about workload, patient expectations, and antibiotic resistance—and until better evidence is available for the use of diagnostics test and of clinical scoring algorithms—general practitioners should probably encourage patients who are not very ill to use symptomatic treatment for most common infections without relying on either diagnostic tests or antibiotics.—Paul Little

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A memorable patient

A communication headache

The argument taking place among the three people waiting to see me next in the headache clinic was not noisy because it was conducted in sign language. My next patient was deaf-mute and had been arguing with her husband, also deaf-mute, and with the hospital interpreter. My patient was refusing to use the interpreter except via her husband. Communication was virtually impossible. Each question took several minutes to go, via interpreter, to husband and to patient, back and forth between husband and wife, and then finally back via interpreter to me. The answers seemed to bear no relation to the questions I thought I had asked. "Her headache has been present for over 40 years, since the age of 10, is getting worse, is present all the time, and the treatments do not work, and no one listens or cares." Wild gesticulating of hands around the head suggested "pain all over."

Only half listening, I leafed through the voluminous hospital notes to try and extract a history. She had been seen by several specialists, and had been investigated extensively as an outpatient and inpatient. The working diagnosis was recorded as "chronic daily headache; ?migraine." Communication seemed always to have been a major problem. She had been tried on various treatments to little effect and had had side effects with everything. Her compliance had been questioned and she had been referred to a pain clinic and had had various nerve blocks, again with marginal benefit.

Getting ever later for the next patient I gave up. I knew that I had failed to understand her and her headache. She knew, too. I increased the dose of migraine prophylaxis, emphasised compliance, weakly said that these things took time, and made her another appointment.

When I saw her again she was obviously no better. Her husband was sullen and glowering. She was tearful and handed me a note about how nothing had worked. It dawned on me that I had not thought of conducting the interview with notes and diagrams. Slowly and laboriously she "drew" her headache for me—it was continuous but fluctuated between nine out of 10 and

10 out of 10, where 10 out of 10 was the worst pain she had ever had; it was always left sided and never crossed the midline. When the pain was particularly severe her left eye would partially close, go red, and water. She had previously considered suicide because of the pain. None of the migraine treatments had helped—she had even tried a triple dose of sumatriptan to see if that would work. The history now sounded like hemicrania continua, in which case the headache should respond to indomethacin. She agreed to try it.

Four weeks later she looked transformed. She handed me a note explaining that her pain was better than it had been for 40 years—again she had "drawn the pain." It now scored one out of 10. She had missed one dose of indomethacin and her pain had returned with a vengeance.

A year on she remains nearly pain free. There have been no problems with her compliance with her indomethacin and now communication seems much easier with or without notes and diagrams. It made me think of the assumptions that I must have made when I first met her. Had I assumed, given that she could not speak, that she could not write either?

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I would like to acknowledge the support of Professor PJ Goadsby who encouraged me to write this article and under whose care this patient was.

We welcome articles up to 600 words on topics such as *A memorable patient*, *A paper that changed my practice*, *My most unfortunate mistake*, or any other piece conveying instruction, pathos, or humour. If possible the article should be supplied on a disk. Permission is needed from the patient or a relative if an identifiable patient is referred to. We also welcome contributions for "Endpieces," consisting of quotations of up to 80 words (but most are considerably shorter) from any source, ancient or modern, which have appealed to the reader.