Commentary: Pattern recognition versus bayesian approach for diagnosis in primary care

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Our first thought on reading this case was, "That's just too unusual. We can't possibly send every 28 year old woman with a bit of chest pain off for echocardiography."¹ In thinking that, we were using pattern recognition—a common approach to clinical diagnosis. We assumed that a young woman could not have noteworthy ischaemic heart disease.

But is there more to this case? If we were to substitute a 28 year old woman for a 50 year old man in the same scenario, most clinicians would recognise a familiar clinical pattern and put ischaemic heart disease high on the list of possible causes of "exertional chest pain relieved by rest." Clinicians interpret symptoms in the light of what they believe are the possible diagnoses for the patient sitting in front of them. Thus ischaemic heart disease is high on the list for older men and low on the list for younger women. But are age and sex good enough predictors of ischaemic heart disease to safely rule in or rule out the diagnosis in a consultation in primary care? Clearly in this case they were not.

Bayesian approach

A bayesian approach to the problem would use all relevant information about the patient to estimate the prior probability of disease before interpreting the history. Mrs Patel is probably at increased risk because of her ethnicity, diabetes, and high body mass index.²⁻⁴ Each of these factors alone carries a relative risk for ischaemic heart disease of between 1.5 and 3.5, outweighing the advantages of female sex and youth.

Even before we consider her symptoms, Mrs Patel has about the same cardiovascular risk as, say, a middle aged white man with no other risk factors. Using this bayesian approach to diagnosis we were less surprised that her chest pain turned out to be angina.

In the average time that a general practitioner has to assess chest pain he or she has to make a decision—to reassure the patient or to refer to a hospital. How easy is it to persuade the local rapid access chest pain service to accept a 28 year old woman? How long will a cardiology referral take to come through? Is admission justified or would it unnecessarily frighten the patient and generate unnecessary costs? Unfortunately, we have no simple tests sensitive enough to safely rule out angina, which often means that referral is necessary.

Pattern recognition serves us well when patients fit the pattern. However, Mrs Patel did not fit a common pattern and our first reaction was wrong. In atypical cases with multiple risk factors we need a more systematic bayesian approach.

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Commentary: Diagnosing chest pain in general practice

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As is often the case, Mrs Patel, a 28 year old woman, presented with chest pain first to her general practitioner.¹ Chest pain is a common presentation in general practice in all age groups, and often difficult to diagnose precisely. More often we attempt to exclude certain diagnoses—not only coronary heart disease but also pulmonary embolism, pneumonia, pneumothorax, and cancer. Most of these have been mentioned in the rapid responses.²

The case progression shows the difficulties that even cardiologists, with extensive hospital resources, have in reaching a clear diagnosis. For the general practitioner, things are even more difficult: the presentation is usually at an earlier stage, symptoms are less specific, and the patient can be lost among the many with benign causes.

Most research on diagnosing chest pain has been hospital based, where caseload is quite different and

investigations more readily available. General practitioners continue to rely on descriptions of symptoms, consideration of underlying risk, and clinical judgment, sometimes helped by an electrocardiogram.³ We have some advantages over our hospital colleagues: we should know more about her family history, we can watch symptoms settle or progress (as they did here), and we know more about the patient's social circumstances.

Context

Social circumstances are important. For myself, in a part of rural Aberdeenshire, it is almost unheard of for a 28 year old woman to develop coronary heart disease. Yes, she has diabetes and obesity, but her diabetes is well controlled and obesity is common. She has normal blood pressure, a commonplace cholesterol concentration, and she has never smoked. Her