Diagnosis and diagnostic testing in primary care

Rational use of diagnostic tests for individual patients is a core skill required of every GP. Despite the widespread acknowledgement that competency in the understanding and application of diagnostic tests is important, medical curricula at undergraduate and postgraduate level do not place substantial emphasis on development and assessment of quantitative diagnostic knowledge and skills, certainly when compared to assessment of competency in therapeutics. This has led some commentators to call for revision in assessment of clinical competencies, so that a greater emphasis is placed on diagnostic competency in postgraduate medical training.[1]

There are particular diagnostic challenges for GPs in primary care: the prior or pre-test probability of disease is lower in community settings, and availability of common diagnostic tests more limited when compared to secondary care.[2] GPs generally deal with far greater diagnostic uncertainty than their hospital-based colleagues, this being part of the key gatekeeping role of primary care.

For these reasons the paper by Fuat *et al* in this month's edition of the Journal, that reports on the diagnostic accuracy of B-type natriuretic peptide (BNP), N-terminal B type natriuretic peptide (NT proBNP) as well as electrocardiogram (ECG) in the diagnosis of left ventricular systolic dysfunction (LVSD), is welcome. Their study shows that application of any of these three tests to patients with an intermediate prior probability of LVSD (estimated in their study population to be 38%) is helpful in 'ruling out' LVSD in a primary care population. The negative likelihood ratios (a measure of the discriminatory power of a negative test result expressed as the proportion of false positives/true positives or 1-sensitivity/specificity) of 0.21, 0.15 and 0.31 for BNP, NT proBNP and ECG produces post-test probabilities for LVSD of 7%, 5% and 10%, respectively. These post-test probabilities are low enough to allow the majority of GPs to either pursue alternative diagnoses for a patient's symptoms or adopt a watchful waiting strategy.

The findings by Fuat *et al* should be viewed in the context of a recent systematic review of diagnostic tests (BNP, NT proBNP, and ECG) in the assessment of LVSD recently published in the Journal.[3] In this review of 32 original diagnostic studies, BNP, NT proBNP and ECG were equivalent in terms of ruling out a diagnosis of LVSD. Although the negative predictive values of BNP and NT proBNP are higher than ECG in Fuat *et al*'s study,[4] the precision of these estimates as measured by the 95% confidence interval around the point estimates, overlap to a large extent. It should also be noted that the negative likelihood ratios for all three diagnostic tests are likely to reduce the probability of LVSD by between 25 to 45%. This magnitude of change is usually sufficient to produce substantial change in diagnostic probability and differential diagnosis ordering, particularly in patients at intermediate pre-test probability.[5]

In the broader context, diagnostic studies, such as the paper by Fuat *et al*, cast light on several uncertainties and challenges for diagnostic research in primary care in general and the diagnosis of LVSD in particular. For accurate diagnosis we need accurate estimates of disease probability for different symptoms, such as shortness of breath. Despite the importance of such data, little empirical research has been carried out that quantifies the probability of organic and non-organic disease in primary care.[2] Without adequate knowledge of pre-test probability estimates, rational and evidence-based test ordering and referral is likely to remain haphazard, inconsistent and variable. For example, test ordering in situations of low pre-test probability of disease is unlikely to alter post-test probability sufficiently enough to change a diagnosis or re-order diagnostic probabilities. Test ordering in situations of low pre-test probability may also produce false–positive test results with resultant patient anxiety, the possibility of iatrogenic harm if further more invasive and expensive tests are subsequently ordered, and potentially inappropriate referral to secondary care.[5]

Quantitative estimates concerning the diagnostic value of elements of the patient's history (symptom complex and relevant past medical and social history) and examination are also important in terms of re-ordering and revising potential differential diagnoses. In this context, formal decision or clinical prediction rules quantify the individual contributions that various components of the history, examination and basic laboratory tests make towards a diagnosis, prognosis or likely response to treatment.[6] An example of a clinical prediction rule relevant to primary care is the Centor score for sore throat — the presence of fever, anterior cervical lymphadenopathy, tonsillar exudate and absence of cough increasing the probability of streptococcal infection.[7] There is a need for ongoing systematic reviews and original research so that clinical prediction rules can be developed validated and tested so that the evidence-base of diagnosis in primary care is improved.

In terms of the diagnosis of LVSD, systematic reviews of diagnostic studies of patients presenting to accident and emergency (A&E) departments suggest that there are important features that make a diagnosis of LVSD more or less likely.[8] Some features help a clinician 'rule in' a diagnosis — past history of LVSD, presence of paroxysmal nocturnal dyspnoea or gallop rhythm/third heart sounds — while other features help to 'rule out' LVSD — absence of past history of LVSD, absence of either dyspnoea on exertion or crepitations on auscultation of the chest.[8] Unfortunately, diagnostic

studies in primary care for LVSD do not describe the diagnostic value of symptoms, signs or their combinations in consistent or clear detail. Individual symptoms and signs appear unlikely to have sufficient diagnostic power to enable a clinician to rule in or rule out a diagnosis of LVSD with any confidence, so recourse to available near-patient diagnostic tests either in the form of ECG or BNP measurement is likely to be helpful.[3,9] More recently and in the context of LVSD diagnosis, further challenges relate to an appropriate 'gold standard' diagnostic test. Nearly all the individual diagnostic accuracy studies for LVSD have used echocardiography as the 'gold standard' in ascertaining whether a patient does or does not suffer from LVSD.[3,8] A recent systematic review suggests that measurement of BNPs, in particular NT proBNP, is a better prognostic marker in symptomatic and asymptomatic patients when compared to other traditional prognostic indicators including symptom scores (New York Heart Association class), other accessible blood tests (serum creatinine concentration) and even measurement of left ventricular dysfunction by echocardiography.[10]

Diagnostic research has a well developed methodological framework and clearly described research standards.[11,12] The challenge for the future is to produce high quality diagnostic research that addresses important clinical problems in primary care. Greater emphasis needs to be given to original research that will produce information, so that establishment of registers of likely pre-test probability estimates for presenting symptoms in primary care can be made. Knowledge of pre-test probability will inform the other types of diagnostic studies that assess and report on the diagnostic value of individual symptoms and symptom complexes.[13] Without this knowledge, uncritical application of diagnostic tests, such as BNP, NT proBNP and ECG in the diagnosis of LVSD, are not going to attain their potential diagnostic value in terms of effective and cost-effective decision making in primary care.

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Back pain — reducing long-term problems

In a 1998 survey in Great Britain, one in 12 adults aged 25–44 years reported having back pain lasting over 1 year.[1] Although 90% of patients with non-specific back pain stop consulting within 3 months, only 25% will have completely recovered after 1 year. Approximately 6% will go on to become chronically disabled.[2]

A key role of a GP should be to help reduce the number of patients presenting with acute lower back pain from going on to develop chronic pain, disability and loss of work. Unfortunately, back pain, being a symptom rather than a disease, suffers from a lack of understanding of its mechanism and a lack of evidence as to which intervention helps a particular patient. However, an escalation of back pain research and a shift in emphasis towards trying to identify early risk factors for chronic pain and disability have the potential to improve GP care and patients' outcomes, particularly outcomes for those who may be vulnerable to developing chronic back pain.

Patients presenting with acute back pain should initially be assessed into one of three groups:[3] non-specific low back pain (the vast majority), those with possible nerve root problems and lastly those with red flags for possible serious