

Editorial

Contemplating thinking about thinking¹

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Despite the increasing move to community care, general practitioners sensing that the traditional gatekeeper role is being eroded by other pre-hospital and community health professionals, assailed by private organisations and now even under threat from the acute sector have staked their claim to the central ground of providing interpersonal care, dealing with uncertainty and managing diagnostic complexity.² As every general practitioner and ‘House’ aficionado knows,³ diagnosis has always been the most challenging, interesting and difficult aspect of our work, presenting, as it does, many pitfalls and much potential for error.

It is becoming increasingly clear that an effective approach to preventing errors needs to embrace individual cognitive errors as well as faults in systems.⁴ In one analysis of diagnostic errors in internal medicine, 46% were found to be due to both system and cognitive error; system causes alone accounted for 19% whereas cognitive factors were evident in 28%. System factors were mainly organisational (policy, procedure, processes, teamwork, communication etc) rather than technical or equipment failure. Most importantly, cognitive factors, described in more detail below, were more frequent than system factors.⁵

Is there any evidence that the process of thinking about thinking, termed ‘metacognition’, can improve the diagnostic process and reduce diagnostic error? The human information processing system, which has been subjected to almost a century of published research, demonstrates some key features that help us to understand medical decision making. Whereas long-term memory is infinite, short-term memory can only hold a few pieces of information (approximating to seven, close to the number of digits in a telephone number), and the time taken to transfer the latter to the former ranges from seconds to minutes. Despite the limitations of short-term memory the human mind can solve complex problems. Research also shows that the pattern of information processing varies with the structure of the task and the problem solver.

Elstein and co-workers’ early studies on the diagnostic process found that it involved four stages: data or cue acquisition (from history, examination and

investigation) based on knowledge, data evaluation, hypothesis generation and hypothesis evaluation or judgement. Hypotheses were generated early in the diagnostic process, few hypotheses were retained at a time (usually only seven or so), and practitioners were reluctant to generate new or multiple hypotheses because of an inherent tendency to limit complexity.

Recent research has shown that experienced doctors solve familiar problems by using pattern recognition and recall based on specific examples from previous experience or case prototypes built up from learning.⁶ Other strategies include heuristics (‘rules of thumb’),⁷ and ruling out worst case scenarios which enable doctors to take shortcuts in routine or critical decisions respectively. Cognitive errors, due to failure in the hypothetico-deductive process in the study described previously were most often due to hypothesis generation and hypothesis evaluation, less often due to faulty data gathering and least often due to faulty knowledge.⁵ Cognitive biases, failed heuristics and cognitive dispositions to respond in a particular way are also sources of cognitive error which are hard wired into the human information-processing system. Over 30 different types of cognitive error found in emergency settings have been described in detail.⁸ The commonest sequence of errors is anchoring (fixing on a mistaken diagnosis too early), ignoring new information, and coming to a conclusion too early, so-called premature closure. It could be argued therefore, that cognitive errors are a special subset of system errors, errors built into the system of human information processing.

A case study in general practice might help illustrate the problem. A young female patient, in her early 30s presented with upper abdominal pain. She was commenced on antacids with initial improvement. A ‘diagnosis’ of reflux quickly led in succession to an H₂ blocker and then a proton pump inhibitor (PPI). During these initial consultations, and after, she did not experience relief of her symptoms despite a PPI, she became anxious and depressed and acquired a further diagnosis of irritable bowel syndrome as well as reflux. This led to a prescription for an antidepressant (serotonin reuptake inhibitor) and antispasmodic in

addition to her PPI. She then also developed vaginal discharge. At this point, within six weeks of her original presentation she was consulting various general practitioners in the practice every 2–3 days. Her case was discussed at a practice meeting when it was even suggested that she should be asked to find another practice, because she was ‘misusing’ the service. Fortunately, common sense prevailed and she was assigned to one general practitioner who would try and unravel the problem. Blood tests were normal. Vaginal swabs confirmed *Trichomonas vaginalis*, which was effectively treated with metronidazole. An abdominal ultrasound revealed gallstones. Her fear dissipated when she understood the problem, began a fat-free diet and subsequently had a successful laparoscopic cholecystectomy.

This example demonstrates ‘anchoring’, ‘premature closure’ (fixing to the diagnosis of reflux and completing the diagnostic process too early) and ‘psych-out error’ (psychological symptoms adversely affecting the diagnostic process),⁸ as well as errors described by Klein.⁹ Just as system flaws, described by the ‘Swiss cheese’ model,⁴ can be analysed with root cause analysis and addressed through introduction of specific defences, barriers and safeguards,¹⁰ cognitive errors can be corrected through metacognition (thinking about thought processes) and mental strategies, termed cognitive ‘forcing functions’. A ‘forcing function’ is simply a mental strategy devised to prevent such errors.^{11,12} Experienced doctors often use such strategies. For example, in cases of rectal bleeding we are taught that a digital rectal examination is mandatory, ‘if you don’t put your finger in it, you’ll put your foot in it’. When prescribing drugs, particularly antibiotics, good doctors always ask about allergies. To prevent premature closure, clinicians should keep an open mind about the diagnostic possibilities and ensure that a working diagnosis does not inadvertently become a definitive diagnosis.

In his seminal work, *The Inner Consultation*, Neighbour describes a technique to improve consultations by imagining observing one’s own consultations in real time.¹³ This self-imposed ‘out of body experience’, leads from an initial sense of depersonalisation, similar to the initial experience of consulting with a camera running, to a potential tool for refining not only the communication but also the analytical processes of the consultation. Increasing education for metacognition,¹⁴ and application of appropriate cognitive forcing strategies may arguably prove to be as

important as a systems approach in future error management.¹⁵

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