

Does the growing complexity of medical data lead to better outcomes?

Dr Michael Page
CEO, Clinipath Pathology
AMA (WA) Board Chair

The number of available pathology tests only grows. This is a good thing – we can delve into the genetics of cancers to better match treatments, predict diseases like Alzheimer's disease more cheaply and quickly, and identify risk factors for our biggest public health problems like cardiovascular disease. But the introduction of new tests is rarely coupled with removal of old ones, and the way pathology laboratories are geared to report tests is additive.

Every new test we offer increases the complexity of the output to the requesting clinician, providing more data to integrate with their own to come to a provisional diagnosis or assess a trend. Artificial intelligence (AI) could go some way to enabling more streamlined delivery of care, but deficiencies in the clinical evidence base underpinning decision-making remain.

In pondering this topic, I was keen to draw a parallel to a frequent frustration – that despite the improvement in computing power by orders of magnitude over the decades, Microsoft Word still takes just as long to load on a contemporary desktop computer as it did three decades ago. So, I self-consciously asked ChatGPT, as I frequently do on a range of subjects: "Am I the only one who feels this way?"

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Apparently not, and the phenomenon has a name – Wirth's law. Put simply, this law states that software is getting slower more rapidly than hardware becomes faster. Yes, we can do many more things on our computers than we used to, but the user experience continues to frustrate and disappoint.

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This is not an argument against innovation, nor a suggestion that every introduction of a new test needs to see the retirement of an old one. Just because we have a new blood test for Alzheimer's disease doesn't mean we don't need to measure serum sodium.

AI has the potential to address this problem, but we are still a long way from genuine "precision medicine" as it has been envisaged. Take cardiovascular prevention: we have many tests and tools to assess cardiovascular risk, but there is no algorithm that integrates all of them to predict risk.

Faced with a patient who has had all of LDL-cholesterol, non-HDL cholesterol, apoB, Lp(a), hsCRP, carotid intima-media thickness and coronary artery calcium score measured, how do you accurately determine their risk – taking into account their demographic and other medical data, and work out the benefits of treatment for that individual?

AI might help us, but the data it would rely on would be disconnected and reliant on many assumptions and inferences that are not supported by a single, longitudinal, outcomes-based study that accounts for all those variables.

AI might reduce the cognitive burden on the clinician, but that won't necessarily make care safer, or better. Digitisation and linkage of data could unlock the real power of AI to do this – where gaps in the peer-reviewed, published evidence exist, AI could find its own answers from huge longitudinal datasets of real-world experience.

This would seem to be a long way off. And even if it were possible, it would be subject to confounding and missing data, ascertainment bias, and other problems.

So, in the meantime, it's incumbent on diagnostic specialists to think about how we present our findings to clinicians, and to the many patients who inevitably look at their results through My Health Record, in a way that is user-friendly, digestible, and readily actionable. ■

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