The promise of high-sensitivity troponin testing

The benefits of diagnostic innovation rely on appropriate clinical practice reforms

The development of troponin T and I assays for assessing and managing patients with chest pain has revolutionised care for those with suspected or confirmed acute coronary syndromes. The availability of these assays has led to more patients who are at increased risk of recurrent cardiac events being identified, plus improvements in selecting patients who might benefit from early invasive management and revascularisation and more potent antithrombotic therapy. Development of point-of-care testing has extended the reach of these assays to inform the care of patients presenting in rural and remote areas of Australia.

However, incremental improvements in analytical precision, with the emergence of assays that enable detection of serum troponin in up to half the apparently normal population, threaten to undo some of the initial gains offered by troponin testing. While increased sensitivity ensures that the problem of missed myocardial infarction (MI) is far less likely, it also creates the problem of reduced specificity. The consequence is a test with a lower positive predictive value for MI.

In this issue of the Journal, two articles highlight the practical implications of using assays with improved precision. One describes a large single-centre observational study comparing emergency department flow and cardiac investigations before and after the implementation of a troponin I assay with improved analytical precision. It shows moderate reductions in time spent in the emergency department with no significant changes in rates of admission to hospital or discharge with a diagnosis of acute coronary syndrome. Hence, it appears that the availability of a troponin assay with improved analytical precision offered the opportunity to arrive at a clinical decision to admit or discharge earlier, but did not change the proportions of patients for whom each of those decisions were made. Of note, there was a significant eight percentage point increase in coronary angiography rate without a commensurate increase in the rate of coronary revascularisation, suggesting a greater rate of invasive investigation that did not lead to coronary lesion-specific therapy. No difference in inhospital mortality due to acute coronary syndrome was observed, and differences in late outcomes would be of great interest but are not currently available.

The other article contemplates the utility of extending troponin testing to primary care to assess patients who present with chest pain. It underscores the challenges of interpreting troponin test results when faced with a single elevated value in a clinical setting where serial testing within hours is impractical because of long turnaround times for results. Thus, troponin testing may be useful for reassuring general practitioners in the context of intermediate or low clinical suspicion of MI, but only when sufficient time has passed since the resolution of symptoms to allow for evidence of myonecrosis (elevated troponin levels) to emerge if it was destined to do so. The pragmatic issue of receiving results in a timely manner to enable an appropriate clinical response remains problematic.

Both of these articles highlight the challenges in translating this diagnostic innovation into effective health care and improved outcomes. Merely improving test precision without an adaptive response in clinical decision making and test interpretation may be a possible driver for increased costs and inefficiencies. While troponin assays with higher analytical precision might offer improved patient outcomes through lower rates of missed MI, they could also increase the investigative burden borne by patients with abnormal test results because of the many non-coronary causes of detectable troponin. Complicating this further is the knowledge that troponin elevation deemed not to be due to unstable coronary plaque is still a marker of increased risk for late mortality, although the current evidence base cannot provide advice on appropriate investigation and management in this common situation.

To reap the returns of improved patient outcomes by providing more efficient clinical care through widespread adoption of innovation in diagnostic testing, such as high-sensitivity troponin assays and point-of-care testing, clinical decision making will need to evolve. Diagnostic innovation will need be used in conjunction with more effective clinical practice, and be used by clinicians who have a clear understanding of the utility of the innovation and are able to appropriately harness the diagnostic information. This will require more robust protocols for risk quantification before troponin tests are requested, coupled with pathways for very early discharge and possibly investigations in ambulatory care settings. Similarly, we urgently need a more sophisticated evidence base for assessing and managing patients who have elevated troponin levels that are deemed not due to an acute coronary syndrome. Only through further clinical and health service research, combined with clinical practice reforms focused on maximising the rule-out decision of a negative result.
Editorials

Data needs in child maltreatment response

Solving the problem begins with accurately measuring its occurrence

Graham V Vimpani

A recent supplement to the American Journal of Preventive Medicine on approaches to measuring the incidence of the leading cause of fatal child maltreatment — inflicted brain injury — a staff member of the World Health Organization asserted that the major element missing from the global response to child maltreatment was “epidemiologically informed methods for monitoring its occurrence”. This view was reinforced when, in the year after its 2009 series on child maltreatment, The Lancet asked leading professionals in child health and welfare what question they most needed to be answered by the scientific published work. Their response was “Are trends in child maltreatment decreasing?”

The difficulties of relying on reporting or notification and substantiation data from statutory child protection agencies to monitor child maltreatment are well known. These data are not good measures of the true prevalence of child abuse and neglect, because they are subject to changes in legislation and reporting policies and practices. This is nowhere more evident than in the impact of prevention and early intervention strategies — a central element of the public health approach to child protection advocated for the past 40 years — is highly problematic.

Alternative measures include the use of mortality and hospital morbidity data. The article by Guthridge and colleagues in this issue of the Journal, examining trends in hospital admissions for child maltreatment-related conditions in the Northern Territory, provides an example of the usefulness of the latter. The WHO and UNICEF have called for uniform reporting procedures for registering both fatal and non-fatal child maltreatment, arguing that health professionals are better placed than others to obtain evidence of maltreatment, and advocating for better systems of communication between health professionals and statutory child protection workers.

The use of hospital morbidity data for surveillance of child maltreatment is not without its pitfalls, though. For a case to be coded under a definitive maltreatment code using the ICD-10-AM (International Classification of Diseases, version 10, Australian modification), clear clinical documentation of evidence of maltreatment is necessary. If documentation shows that an injury, for example, is queued as suspicious, but there is no documentation of further investigation being done to rule out or substantiate maltreatment, coding rules prevent the assignment of a definitive maltreatment code but allow for the case to be...