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Cover Picture:  
Li Shih-Chen (1518-1593):  
Herbalist of Renown  
(Refer to page 338-339)

# Pre-Operative Tests – More is Not Necessarily Better

T W K Lew, Y C Lai

The purpose of a pre-operative medical evaluation is multi-fold. First, it is a focused and detailed examination of a patient, to make an accurate determination of the presence or absence of systemic disease and to ascertain its severity. Second, based on this examination, an assessment of the potential perioperative mortality and morbidity risks is made, relative to the complexity and urgency of the planned procedure and its predicted short- and long-term physiological demands on the patient. Third, a decision is made as to whether to proceed with the operation or to offer alternative treatment.

Options may include further evaluation to stratify the severity of the illness. The outcome of these investigations may result in the postponement of planned surgery, if further optimisation is deemed necessary. Alternatively, the need for a procedure relative to the predicted risk may be deemed unacceptable to both patient and doctor after further evaluation and the procedure is cancelled or altered. Decisions based on patients' risks, surgical risks and relative benefits are multi-dimensional and complex, but may be aided by a decision analytic approach using one or more disease specific algorithm-based templates available<sup>(1,2)</sup>.

Several trends over the past decade have influenced how we currently approach preoperative assessment. First, perioperative mortality and morbidity risks are indeed lower today than they were in the past, in part due to healthier patients, better anaesthetic management, surgical techniques, and perioperative care. For example, cardiac risks for non-cardiac surgery have been reduced significantly<sup>(3)</sup>. Timely treatment of patients with recent myocardial infarctions has altered its natural history to the extent that perioperative priorities have shifted to the detection of ongoing ischaemia rather than based on duration of time after the event<sup>(1)</sup>. Second, these trends are applicable locally – the Ministry of Health's quality indicator on perioperative mortality, based on the methodology of the Maryland Hospital Association Quality Indicator Project (QIP) compares favourably when benchmarked against 1,804 hospitals worldwide making up the Project's International QIP reference database. Third, there is a trend towards more ambulatory and same-day admission surgery worldwide. In Singapore, ambulatory procedures have almost doubled in the past five years, and as a percentage of total procedures, have increased from 41% in 1998 to 52% in 2002<sup>(4)</sup>. This implies a need to organise comprehensive risk assessment for the majority of patients in an outpatient setting<sup>(5,6)</sup>. Fourth, better available data and understanding of the predictive value of abnormal tests and cost-

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containment pressures have altered the traditional “routine” approach to adjunctive laboratory testing.

The study by Lim and Liu in this issue of the SMJ<sup>(7)</sup> is timely and lends further weight to the evidence that “routine” preoperative testing is not cost-effective and may not be justified. In their study, based on an audit of over 800 consecutive surgical patients aged 40 years and above over a one month period, the yields of abnormal chest radiographs (CXR) and electrocardiograms (ECG) were 12% and 23% respectively. Findings significant enough to affect clinical management or alter prior decisions on procedures accounted for only 11 (29%) and 13 (15%) of abnormal tests respectively. There was a higher abnormal yield with increasing pre-operative morbidity, using the American Society of Anaesthesiology (ASA) physical status classification, with one in two patients and one in three patients in ASA Class 3 and 4 showing abnormalities in CXR and ECG respectively. For a preoperative investigation to be useful, it should be sensitive and specific. In addition, any significant abnormality, when detected, should be corrected so as to reduce the perioperative risk. The study would have been stronger had they tracked the outcome of patients with abnormalities for the cohort studied, or were able to determine that their conclusions were not significantly altered by the exclusion of abnormalities detected earlier in previously cancelled or postponed patients not captured in their audit.

Lim’s study illustrates the need for a targeted approach towards ordering investigations instead of the traditional view of using age as a sole requirement for routine investigations<sup>(8)</sup>. A meta-analysis by Archer of published reports from 1966 to 1992 scrutinised twenty-one reports, showing an average abnormality pickup rate of 10% of routine Chest X-rays, of which only 1.3% were unexpected<sup>(9)</sup>. Particularly disturbing were reports where substantial harm resulted from additional procedures that were performed upon abnormal shadows picked up on a routine Chest X-ray<sup>(10)</sup>. This brings to mind the basic medical tenet of *primum non nocere*, and whether the test should have been carried out in the first place.

Studies on pre-operative laboratory testing with a low rate of abnormalities detected must also be interpreted cautiously. Schein et al studied 20,000 patients aged above 70 years undergoing cataract surgery randomised to routine laboratory testing or no-routine testing<sup>(10)</sup>. He found no difference in perioperative mortality and morbidity between the two groups. His study must however be taken in the context of very low risk in the type of surgery and anaesthesia technique studied, and patients who were already very well optimised by their primary care physicians. In the Singapore context, an ageing population, with polypharmacy<sup>(11)</sup>, self-medication, and traditional (alternative) medicine attendance characteristics provide for a challenging diagnostic environment for the perioperative physician. Some structured guidelines to pre-operative screening tests may thus be better than a totally non-routine approach.

It is still too early to determine the impact of the Severe Acute Respiratory Syndrome epidemic on preoperative evaluation practices. At the very least, it will increase the role of preoperative chest radiographs for reasons related more to public health considerations than perioperative risk. It will also increase the rationale for increasing ambulatory rather than in-patient facilities for relatively healthy patients undergoing elective or minor emergency surgery.

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Who should determine pre-operative testing requirements? Starsnic showed that an anaesthesiologist-based system augmented by surgical input is more cost efficacious than a traditional surgeon-based system<sup>(12)</sup>. Others have shown that the simple dissemination of guidelines determined by a multi-disciplinary group will also result in significant cost savings<sup>(13)</sup>. In our view, a collaborative approach between an anaesthesiologist-based clinic and surgeons, with the active participation of specialty referral clinics provides the best opportunities for optimisation.

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