

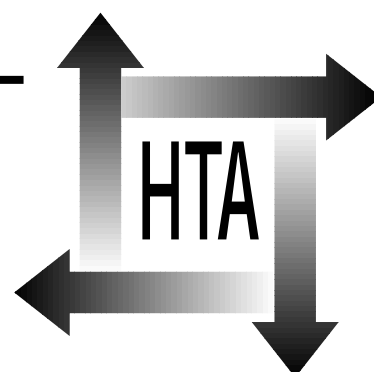
Executive summary

**Routine preoperative testing:
a systematic review of the evidence**

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Executive summary

Objectives

- To review the available evidence on the value of routine preoperative testing in healthy or asymptomatic adults.
- To assess the completeness of existing reviews of preoperative testing and how applicable their conclusions are to the UK.
- To identify areas for further research.

How the research was conducted

The databases Medline, Embase, *Biological Abstracts*, *Science Citation Index* and HealthSTAR were thoroughly searched for relevant articles which were then classified and appraised. The databases of the Centre for Reviews and Dissemination (DARE and NHS Economic Evaluations Database) and the Cochrane Collaboration (the Cochrane Library) were also used to verify the completeness of the search.

In this review, 'routine' tests are defined as those ordered for an asymptomatic, apparently healthy individual in the absence of any specific clinical indication, to identify conditions undetected by clinical history and examination.

Research findings

No controlled trials of the value of the following routine preoperative tests have been published. All available evidence reports the results of case-series.

Chest X-ray

Few studies allow the outcome of routine chest X-rays to be distinguished from those of indicated chest X-rays, and fewer have gone beyond abnormality yields to examine the impact on clinical management.

Findings from routine preoperative chest X-ray are reported as abnormal in 2.5–37.0% of cases, and lead to a change in clinical management in 0–2.1% of patients. The effect on patient outcomes is unknown.

Both abnormality yield and impact on patient management rise with age and poorer American Society of Anesthesiologists (ASA) status.

The limited evidence on the value of a chest X-ray as a baseline measure suggests that it will be of value in less than 9% of patients.

Electrocardiography

The findings from routine preoperative electrocardiograms (ECGs) are abnormal in 4.6–31.7% of cases, and lead to a change of management in 0–2.2% of patients. The effect on patient outcomes is unknown.

The proportion of abnormal tests rises with age and worsening ASA status.

The predictive power of preoperative ECGs for postoperative cardiac complications in non-cardiopulmonary surgery is weak.

There is no evidence to support the value of recording a preoperative ECG as a 'baseline'.

Haemoglobin measurement and blood counts

Routine preoperative measurement shows that the haemoglobin level may be lower than 10–10.5 g/dl in up to 5% of patients, but that it is rarely lower than 9 g/dl. The routine test leads to a change of management in 0.1% to 2.7% of patients.

Routine preoperative measurement shows that the platelet count is abnormally low in less than 1.1% of patients, and that platelet count results rarely if ever lead to change in management of patients.

Routine preoperative white blood cell count is abnormal in less than 1% of patients, and rarely if ever leads to change in management of patients.

Tests of haemostasis

Abnormalities of bleeding time, prothrombin time and partial thromboplastin time are found in up to 3.8%, 4.8% and 15.6% of routine preoperative tests, respectively. The results of these tests very rarely lead to change in the clinical management of patients.

Biochemistry

In routine preoperative tests of serum biochemistry, abnormal levels of sodium or potassium are found in up to 1.4% of patients, and abnormal levels of urea or creatinine are found in up to 2.5% of patients. Abnormal levels of glucose are found in up to 5.2% of patients. These abnormalities rarely lead to change in clinical management of patients.

Urine testing

Routine preoperative urinalysis finds abnormal results in 1–34.1% of patients, and leads to a change of management in 0.1–2.8% of patients. The only abnormality that leads to a change in management of patients is the finding of white blood cells in the urine.

There is no good evidence that preoperative abnormal urinalysis is associated with any post-operative complication in non-urinary tract surgery.

There is little or no apparent value in routine preoperative urinalysis as an opportunistic screening test for unrelated disease, since even when abnormalities are found, they evoke no change in clinical management.

Conclusions

The tests reviewed produce a wide range of abnormal results, even in apparently healthy individuals.

The clinical importance of many of these abnormal results is uncertain.

The tests lead to changes in clinical management in only a very small proportion of patients, and for some tests virtually never.

The clinical value of changes in management which do occur in response to an abnormal test result may also be uncertain in some instances.

The power of preoperative tests to predict adverse postoperative outcomes in asymptomatic patients is either weak or non-existent. However, the same tests may have greater predictive power in defined high-risk populations.

For all the tests reviewed, a policy of routine testing in apparently healthy individuals is likely to lead to little, if any, benefit. It remains possible that routine testing could still be of some benefit in asymptomatic patients in defined groups, such as those over a given age. No good evidence exists to suggest that this will be the case but conversely, no good evidence exists to suggest that it will not.

Recommendations

Primary research studies

Further studies should investigate whether routine testing would be of benefit in a clearly defined asymptomatic population who are potentially at risk of perioperative complications, for example, older patients. Such studies could include the following:

- prospective case-series examining the impact on clinical management of routine testing in patients over, for example, 60 years of age
- randomised trials of alternative testing policies in older patients who may be at higher risk of complications (if such a trial were to be undertaken it should include an economic evaluation, address the marginal benefits of testing over clinical examination, and allow results for each individual type of test to be isolated if more than one test is the subject of the trial)
- studies to assess the value of the preoperative chest X-ray or ECG as a 'baseline' in defined groups of patients at high risk of postoperative cardiorespiratory complications.

Analysis of existing research

Taking the present review as a starting point, further analysis of the existing evidence could examine a number of issues in greater depth. These issues would include the following.

- Estimates of predictive values or likelihood ratios for each test in predicting postoperative events should be derived from those studies that contain adequate data.
- The potential for pooling results from existing studies should be examined. Data from those with similar study samples, methods and outcomes could be pooled to provide more precise estimates of abnormality and impact rates for each test.
- Economic modelling of the likely resource costs and patient benefits of current practice should be undertaken using best estimates of test performance.
- A review of available evidence on the performance of test selection algorithms, such as the US HealthQuiz instrument, should be undertaken.

Publication

Munro J, Booth A, Nicholl J. Routine preoperative testing: a systematic review of the evidence. *Health Technol Assessment* 1997; 1 (12).

NHS R&D HTA Programme

The overall aim of the NHS R&D Health Technology Assessment (HTA) programme is to ensure that high-quality research information on the costs, effectiveness and broader impact of health technologies is produced in the most efficient way for those who use, manage and work in the NHS. Research is undertaken in those areas where the evidence will lead to the greatest benefits to patients, either through improved patient outcomes or the most efficient use of NHS resources.

The Standing Group on Health Technology advises on national priorities for health technology assessment. Six advisory panels assist the Standing Group in identifying and prioritising projects. These priorities are then considered by the HTA Commissioning Board supported by the National Coordinating Centre for HTA (NCCHTA).

This report is one of a series covering acute care, diagnostics and imaging, methodology, pharmaceuticals, population screening, and primary and community care.

The views expressed in this publication are those of the authors and not necessarily those of the Standing Group, the Commissioning Board, the Panel members or the Department of Health.

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