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Routine Preoperative Laboratory Tests for Elective Surgery

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GUIDELINE TITLE Routine Preoperative Tests for Elective Surgery

DEVELOPER National Clinical Guideline Centre (NCGC)

RELEASE DATE April 2016

PRIOR VERSION June 2003

FUNDING SOURCE National Institute for Health and Care Excellence (NICE)

TARGET POPULATION Patients older than 16 years who are American Society of Anesthesiologists (ASA) grade 1 to 4 with 1 or more medical comorbidity and having minor, intermediate, or major or complex elective surgery (excluding cardiothoracic or neurosurgery).

MAJOR RECOMMENDATIONS

- For ASA grade 1 or 2 patients undergoing minor surgery (eg, excising skin lesion), do not routinely offer preoperative laboratory tests. For ASA grade 3 or 4, consider renal function testing in patients at risk of acute kidney injury (AKI).
- For ASA grade 1 patients undergoing intermediate surgery (eg, inguinal hernia repair), do not routinely offer any preoperative laboratory tests. For ASA grade 2 patients, consider renal function testing in patients at risk of AKI. For ASA grade 3 or 4 patients, offer renal function testing; for patients with cardiovascular or renal disease with recent symptoms, consider performing complete blood cell (CBC) counts; for those with chronic liver disease or taking anticoagulants, consider coagulation testing.
- For all patients undergoing major or complex surgery, offer preoperative laboratory testing with CBC counts and renal function (for ASA grade 1, consider renal function testing only in patients at risk of AKI). Consider coagulation testing in ASA grade 3 or 4 patients with chronic liver disease or taking anticoagulants.
- Do not routinely offer testing for sickle cell disease, hemoglobin A_{1c} (HbA_{1c}) testing for patients without diabetes, or urinalysis.
- In women of childbearing potential, ask about the possibility of pregnancy and advise patients on fetal risks of surgery.

Summary of the Clinical Problem

Preoperative evaluation, often including laboratory testing, is used to assess a patient's risk for perioperative adverse events, characterize the current status of systemic disease, and identify any unrecognized risk factors or disease that may increase risk of complications. Preoperative testing may lead to significant harms and costs, particularly when false-positive or incidental findings are uncovered.[1] Testing often does not significantly change management in relatively healthy patients.[2] There is significant variability in clinical practice regarding "routine" preoperative testing for elective surgery in healthy and comorbid populations. This guideline addresses the use of selected and specific common laboratory tests for nonpregnant adults undergoing elective surgery (excluding cardiothoracic surgery or neurosurgery).

Characteristics of the Guideline Source

This guideline was developed by the NCGC with funding from the UK NICE. The guideline development group (GDG) comprised clinical specialists and generalists, researchers, patients, and caregivers. Members completed conflict of interest disclosures at each meeting. No actions beyond declarations were taken (**Table**).

Evidence Base

This guideline updates a 2003 guideline that was based largely on expert consensus and was commissioned after the publication of a 2012 systematic review addressing routine preoperative testing. That review found only 5 observational studies addressing CBC counts and renal function testing and suggested that routine testing in healthy patients rarely uncovers abnormal results or changes management.[3] For this update, evidence regarding preoperative CBC counts, testing of renal function and coagulation, and testing for pregnancy and sickle cell disease published before July 2015 was reviewed. A systematic review was conducted regarding preoperative HbA_{1c} testing. Meta-analysis was planned but not performed because of the nature of the available evidence. Results from single studies were presented. The GDG appraised quality of evidence using an adaptation of the GRADE criteria.

Recommendations were drafted by interpretation of the evidence or based on expert opinion when evidence was of poor quality, conflicting, or absent. A modified Delphi survey with formal consensus defined as at least 70% agreement was also considered alongside any available evidence, but the GDG ultimately drafted recommendations based on their consensus (eg, when they felt that Delphi results reflected more traditional or conservative practice). Finally, strength of the recommendation was designated as "offer," "consider," or "do not routinely offer" based on available evidence.[4]

For CBC count, 8 retrospective and 2 prospective studies were included.[4] Evidence was mainly of low or very low quality and pertained

Table. Guideline Rating

Standard	Rating
Establishing transparency	Good
Management of conflict of interest in the guideline development group	Good
Guideline development group composition	Good
Clinical practice guideline–systematic review intersection	Poor
Establishing evidence foundations and rating strength for each of the guideline recommendations	Poor
Articulation of recommendations	Fair
External review	Good
Updating	Good
Implementation issues	Good

to patients of higher ASA grades undergoing major surgeries. Most studies found anemia to be associated with poorer outcomes. One moderate-quality retrospective cohort study of 7679 patients found increased risk of 90-day mortality in patients with preoperative anemia (adjusted odds ratio [OR], 2.36; 95% CI, 1.57-3.55).[4]

For renal function testing, 3 low- or very low–quality retrospective studies were included, all of which noted an association between increased glomerular filtration rate (GFR) and better outcomes. The largest was a post hoc analysis of a prospective study of 2323 noncardiac surgery patients demonstrating increased mortality risk and risk of major adverse events with progressive stages of chronic kidney disease, although 34% of data was missing.[4]

For HbA_{1c} testing, a systematic review identified 4 retrospective cohort studies and 1 prospective observational study. Evidence was from a limited range of surgeries and was graded as low or very low quality. For patients with diabetes, there were weak but inconsistent associations between HbA_{1c} of 7% or higher and poor outcomes vs HbA_{1c} less than 7%.[3] In 2 retrospective studies addressing joint arthroplasty, one study of 6088 patients found that HbA_{1c} of 7% or higher was associated with increased risk of mortality (adjusted OR, 1.37; 95% CI, 0.82-2.29) and surgical complications (adjusted OR, 1.22; 95% CI, 1.01-1.47), whereas another study of 328 patients found HbA_{1c} of 7% or higher to not be predictive of joint infections (adjusted hazard ratio, 0.86; 95% CI, 0.68-1.09) but did predict death (adjusted hazard ratio, 1.30; 95% CI, 1.08-1.56).[4]

For coagulation testing, sickle cell disease testing, urinalysis, and pregnancy testing, no trial evidence was available, so recommendations were based on expert opinion and informed via the Delphi survey, in which limited consensus was reached.

Benefits and Harms

Potential benefits of preoperative testing are detection of previously undiagnosed conditions that could affect a patient in the perioperative setting. There is insufficient evidence that surgical outcomes are changed by preoperative testing. This is the case even when abnormal test results are associated with worse outcomes. The overwhelming opinion of the GDG was that the results of most testing would not change management in most individuals undergoing minor and intermediate surgery, with the exception of those with significant comorbidities.[4] The GDG also noted that for conditions in which guidelines exist regarding general screening (eg, sickle cell disease, diabetes), pathways already in place for screening were more appropriate than preoperative screening.[4]

Harms of preoperative laboratory testing are the small risks associated with venipuncture and the potential for false-positive results that might cause undue anxiety or postpone necessary procedures. The financial costs associated with the test, staff time, and equipment were detailed for each procedure.[3]

Discussion

This guideline demonstrates the lack of reliable evidence underlying recommendations for preoperative testing. The recommendations put forth in these guidelines come largely from expert opinion. As noted above, there were several cases in which the GDG's opinion largely informed recommendations, particularly for testing for which there was little or no evidence guiding recommendations (eg, sickle cell disease testing, urinalysis).[4]

Most other societies and guidelines agree that the decisions to pursue preoperative laboratory testing should be based on history and physical examination, and those recommendations consistently note the reliance on expert opinion and low-quality evidence. Low-risk surgical procedures are most commonly targeted as those for which testing may be avoided; for example, the Society of General Internal Medicine included this recommendation in the Choosing Wisely campaign, and this was highlighted in practice advisories by both the American Society of Anesthesiologists and the Institute for Clinical Systems Improvement.[5-7]

Areas in Need of Future Study or Ongoing Research

The paucity of published evidence on the clinical effectiveness, safety, and cost-effectiveness of routine preoperative laboratory testing has been highlighted by this guideline and others. There remains a pressing need for higher-quality evidence stratified by the 2 main risk classifications of interest, patients status and surgical risk, that would provide guidance an area that has been largely informed by the expert opinions of groups and societies.

Related guidelines

Institute for Clinical Systems Improvement Perioperative Protocol. March 2014.

American Society of Anesthesiologists Practice Advisory for Preanesthesia Evaluation. Updated 2012.

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Conflict of Interest Disclosures: The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

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