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Routine preoperative tests for elective surgery

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Overview

This guideline covers routine preoperative tests for people aged over 16 who are having elective surgery. It aims to reduce unnecessary testing by advising which tests to offer people before minor, intermediate and major or complex surgery, taking into account specific comorbidities (cardiovascular, renal and respiratory conditions and diabetes and obesity). It does not cover pregnant women or people having cardiothoracic procedures or neurosurgery.

Who is it for?

- Healthcare professionals
- People having elective surgery, their families and carers

This guideline updates and replaces NICE guideline CG3 (published June 2003).

Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in your care [<http://www.nice.org.uk/about/nice-communities/public-involvement/your-care>].

We expect you to take our guidance into account. But you should always base decisions on the person you are working with.

Making decisions using NICE guidelines [<http://www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/nice-guidelines/using-NICE-guidelines-to-make-decisions>] explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

Guidance on consent for young people aged 16–17 is available from the reference guide to consent for examination or treatment [<http://www.gov.uk/government/publications/reference-guide-to-consent-for-examination-or-treatment-second-edition>] (Department of Health).

The tests covered by this guideline are:

- chest X-ray
- echocardiography (resting)
- electrocardiography (ECG; resting)
- full blood count (haemoglobin, white blood cell count and platelet count)
- glycated haemoglobin (HbA1c) testing
- haemostasis tests
- kidney function (estimated glomerular filtration rate, electrolytes, creatinine and sometimes urea levels)
- lung function tests (spirometry, including peak expiratory flow rate, forced vital capacity and forced expiratory volume) and arterial blood gas analysis
- polysomnography
- pregnancy testing
- sickle cell disease/trait tests
- urine tests.

The recommendations were developed in relation to the following comorbidities:

- cardiovascular
- diabetes
- obesity
- renal
- respiratory.

Recommendations relevant for all types of surgery

A colour poster version of these recommendations can be downloaded from tools and resources [<http://www.nice.org.uk/guidance/ng45/resources>].

1.1 Communication

- 1.1.1 When offering tests before surgery, give people information in line with recommendations (including those on consent and capacity) made in the NICE guideline on patient experience in adult NHS services [<http://www.nice.org.uk/guidance/cg138>].
- 1.1.2 Ensure that the results of any preoperative tests undertaken in primary care are included when referring people for surgical consultation.

1.2 Considering existing medicines

- 1.2.1 Take into account any medicines people are taking when considering whether to offer any preoperative test.

1.3 Pregnancy tests

- 1.3.1 On the day of surgery, sensitively ask all women of childbearing potential whether there is any possibility they could be pregnant.
- 1.3.2 Make sure women who could possibly be pregnant are aware of the risks of the anaesthetic and the procedure to the fetus.
- 1.3.3 Document all discussions with women about whether or not to carry out a pregnancy test.
- 1.3.4 Carry out a pregnancy test with the woman's consent if there is any doubt about whether she could be pregnant.
- 1.3.5 Develop locally agreed protocols for checking pregnancy status before surgery.
- 1.3.6 Make sure protocols are documented and audited, and in line with statutory and professional guidance.

1.4 Sickle cell disease or sickle cell trait tests

- 1.4.1 Do not routinely offer testing for sickle cell disease or sickle cell trait before surgery.
- 1.4.2 Ask the person having surgery if they or any member of their family have sickle cell disease.
- 1.4.3 If the person is known to have sickle cell disease and has their disease managed by a specialist sickle cell service, liaise with this team before surgery.

1.5 HbA1c testing for people without diagnosed diabetes

- 1.5.1 Do not routinely offer HbA1c testing before surgery to people without diagnosed diabetes.

1.6 HbA1c testing for people with diabetes

- 1.6.1 People with diabetes who are being referred for surgical consultation from primary care should have their most recent HbA1c test results included in their referral information.
- 1.6.2 Offer HbA1c testing to people with diabetes having surgery if they have not been tested in the last 3 months.

1.7 Urine tests

- 1.7.1 Do not routinely offer urine dipstick tests before surgery.
- 1.7.2 Consider microscopy and culture of midstream urine sample before surgery if the presence of a urinary tract infection would influence the decision to operate.

1.8 Chest X-ray

- 1.8.1 Do not routinely offer chest X-rays before surgery.

1.9 Echocardiography

- 1.9.1 Do not routinely offer resting echocardiography before surgery.
- 1.9.2 Consider resting echocardiography if the person has:
 - a heart murmur **and** any cardiac symptom (including breathlessness, pre-syncope, syncope or chest pain) **or**
 - signs or symptoms of heart failure.

Before ordering the resting echocardiogram, carry out a resting electrocardiogram (ECG) and discuss the findings with an anaesthetist.

Recommendations for specific surgery grades (minor, intermediate, and major or complex) and ASA grades

The following recommendations are specific to surgery grade and ASA grade.

Surgery grades

Surgery grades	Examples
Minor	<ul style="list-style-type: none">• excising skin lesion• draining breast abscess
Intermediate	<ul style="list-style-type: none">• primary repair of inguinal hernia• excising varicose veins in the leg• tonsillectomy or adenotonsillectomy• knee arthroscopy
Major or complex	<ul style="list-style-type: none">• total abdominal hysterectomy• endoscopic resection of prostate• lumbar discectomy• thyroidectomy• total joint replacement• lung operations• colonic resection• radical neck dissection

ASA grades

The ASA (American Society of Anesthesiologists) Physical Status Classification System [<http://www.asahq.org/resources/clinical-information/asa-physical-status-classification-system>] is a simple scale describing fitness to undergo an anaesthetic. The ASA states that it does not endorse any elaboration of these definitions. However, anaesthetists in the UK often qualify (or interpret) these grades as relating to functional

capacity – that is, comorbidity that does not (ASA 2) or that does (ASA 3) limit a person's activity.

ASA 1	A normal healthy patient
ASA 2	A patient with mild systemic disease
ASA 3	A patient with severe systemic disease
ASA 4	A patient with severe systemic disease that is a constant threat to life

Key to recommendations in tables

[Yes] Offer the test

[Not routinely] Do not routinely offer the test

[Consider] Consider the test (the value of carrying out the test may depend on specific patient characteristics)

Table 1 Minor surgery

Test	ASA grade		
	ASA 1	ASA 2	ASA 3 or ASA 4
Full blood count	Not routinely	Not routinely	Not routinely
Haemostasis	Not routinely	Not routinely	Not routinely
Kidney function	Not routinely	Not routinely	Consider in people at risk of AKI ¹
ECG	Not routinely	Not routinely	Consider if no ECG results available from past 12 months
Lung function/arterial blood gas	Not routinely	Not routinely	Not routinely

AKI, acute kidney injury. ¹See recommendation 1.1.8 of the NICE guideline on acute kidney injury [<http://www.nice.org.uk/guidance/cg169/chapter/1-Recommendations#assessing-risk-factors-in-adults-having-surgery>].

Table 2 Intermediate surgery

Test	ASA grade		
	ASA 1	ASA 2	ASA 3 or ASA 4
Full blood count	Not routinely	Not routinely	Consider for people with cardiovascular or renal disease if any symptoms not recently investigated
Haemostasis	Not routinely	Not routinely	Consider in people with chronic liver disease <ul style="list-style-type: none"> If people taking anticoagulants need modification of their treatment regimen, make an individualised plan in line with local guidance If clotting status needs to be tested before surgery (depending on local guidance) use point-of-care testing¹

Table 2 (continued)

Test	ASA grade		
	ASA 1	ASA 2	ASA 3 or ASA 4
Kidney function	Not routinely	Consider in people at risk of AKI ²	Yes
ECG	Not routinely	Consider for people with cardiovascular, renal or diabetes comorbidities	Yes
Lung function/arterial blood gas	Not routinely	Not routinely	Consider seeking advice from a senior anaesthetist as soon as possible after assessment for people who are ASA grade 3 or 4 due to known or suspected respiratory disease

AKI, acute kidney injury. ¹Note that currently the effects of direct oral anticoagulants (DOACs) cannot be measured by routine testing. ²See recommendation 1.1.8 of the NICE guideline on acute kidney injury [<http://www.nice.org.uk/guidance/cg169/chapter/1-Recommendations#assessing-risk-factors-in-adults-having-surgery>].

Table 3 Major or complex surgery

Test	ASA grade		
	ASA 1	ASA 2	ASA 3 or ASA 4
Full blood count	Yes	Yes	Yes
Haemostasis	Not routinely	Not routinely	Consider in people with chronic liver disease <ul style="list-style-type: none"> If people taking anticoagulants need modification of their treatment regimen, make an individualised plan in line with local guidance If clotting status needs to be tested before surgery (depending on local guidance) use point-of-care testing¹
Kidney function	Consider in people at risk of AKI ²	Yes	Yes
ECG	Consider for people aged over 65 if no ECG results available from past 12 months	Yes	Yes

Table 3 (continued)

Test	ASA grade		
	ASA 1	ASA 2	ASA 3 or ASA 4
Lung function/arterial blood gas	Not routinely	Not routinely	Consider seeking advice from a senior anaesthetist as soon as possible after assessment for people who are ASA grade 3 or 4 due to known or suspected respiratory disease
AKI, acute kidney injury. ¹ Note that currently the effects of direct oral anticoagulants (DOACs) cannot be measured by routine testing. ² See recommendation 1.1.8 of the NICE guideline on acute kidney injury [http://www.nice.org.uk/guidance/cg169/chapter/1-Recommendations#assessing-risk-factors-in-adults-having-surgery].			

Putting this guideline into practice

NICE has produced tools and resources [<http://www.nice.org.uk/guidance/ng45/resources>] to help you put this guideline into practice.

Putting recommendations into practice can take time. How long may vary from guideline to guideline, and depends on how much change in practice or services is needed. Implementing change is most effective when aligned with local priorities.

Changes recommended for clinical practice that can be done quickly – like changes in prescribing practice – should be shared quickly. This is because healthcare professionals should use guidelines to guide their work – as is required by professional regulating bodies such as the General Medical and Nursing and Midwifery Councils.

Changes should be implemented as soon as possible, unless there is a good reason for not doing so (for example, if it would be better value for money if a package of recommendations were all implemented at once).

Different organisations may need different approaches to implementation, depending on their size and function. Sometimes individual practitioners may be able to respond to recommendations to improve their practice more quickly than large organisations.

Here are some pointers to help organisations put NICE guidelines into practice:

- 1 **Raise awareness** through routine communication channels, such as email or newsletters, regular meetings, internal staff briefings and other communications with all relevant partner organisations. Identify things staff can include in their own practice straight away.

- 2 **Identify a lead** with an interest in the topic to champion the guideline and motivate others to support its use and make service changes, and to find out any significant issues locally.
- 3 **Carry out a baseline assessment** against the recommendations to find out whether there are gaps in current service provision.
- 4 **Think about what data you need to measure improvement** and plan how you will collect it. You may want to work with other health and social care organisations and specialist groups to compare current practice with the recommendations. This may also help identify local issues that will slow or prevent implementation.
- 5 **Develop an action plan**, with the steps needed to put the guideline into practice, and make sure it is ready as soon as possible. Big, complex changes may take longer to implement, but some may be quick and easy to do. An action plan will help in both cases.
- 6 **For very big changes** include milestones and a business case, which will set out additional costs, savings and possible areas for disinvestment. A small project group could develop the action plan. The group might include the guideline champion, a senior organisational sponsor, staff involved in the associated services, finance and information professionals.
- 7 **Implement the action plan** with oversight from the lead and the project group. Big projects may also need project management support.
- 8 **Review and monitor** how well the guideline is being implemented through the project group. Share progress with those involved in making improvements, as well as relevant boards and local partners.

NICE provides a comprehensive programme of support and resources to maximise uptake and use of evidence and guidance. See our into practice [<http://www.nice.org.uk/about/what-we-do/into-practice>] pages for more information.

Also see Leng G, Moore V, Abraham S, editors (2014) *Achieving high quality care – practical experience from NICE*. Chichester: Wiley.

Context

In 2003, NICE first issued guidance on the use of routine preoperative tests for people having elective surgery. Many apparently healthy people are tested before surgery to check for undetected conditions that might affect their treatment. This can provide a benefit where test results yield additional information that cannot be obtained from a patient history and physical examination alone. However, excessive preoperative testing can cause significant anxiety, delays in treatment and unnecessary, costly and possibly harmful treatments when false positive results are obtained. Even genuinely abnormal results often do not result in any

significant change in perioperative management in relatively healthy people.

Since 2003 there has been a reduction in the ordering of routine tests for young, healthy people having minor surgery (What is the value of routinely testing full blood count, electrolytes and urea, and pulmonary function tests before elective surgery in patients with no apparent clinical indication and in subgroups of patients with common comorbidities: a systematic review of the clinical and cost-effective literature, Czoski-Murray C et al. 2012). However, there remains a concern that some unnecessary tests continue to be requested. According to Hospital Episode Statistics 2012–13 (Health and Social Care Information Centre) the NHS in England completed 10.6 million operations compared with 6.61 million in 2002–03 (Hospital Episode Statistics 2002–03 Health and Social Care Information Centre), an increase of 60%. Therefore even a small percentage of unnecessary preoperative testing can affect a large number of people.

Over the past 12 years preoperative assessment has changed radically. Most people are now seen well in advance of surgery in a preoperative assessment clinic, where a structured history and targeted examination are performed by experienced nursing staff. Some preoperative tests have been abandoned in favour of others (for example random blood glucose in favour of HbA1c), while new tests have been developed that are increasingly being used in some people having elective surgery (for example non-invasive cardiac stress tests, cardiopulmonary exercise test and polysomnography).

More information

You can also see this guideline in the NICE pathway on preoperative tests [<http://pathways.nice.org.uk/pathways/preoperative-tests>].

To find out what NICE has said on topics related to this guideline, see our web page on surgical care [<http://www.nice.org.uk/guidance/service-delivery-organisation-and-staffing/surgical-care>].

See also the guideline committee's discussion and the evidence reviews (in the full guideline [<http://www.nice.org.uk/Guidance/NG45/evidence>]), and information about how the guideline was developed [<http://www.nice.org.uk/Guidance/NG45/documents>], including details of the committee.

Recommendations for research

The guideline committee has made the following recommendations for research.

1 Polysomnography

- Does preoperative screening of people who are at risk of obstructive sleep apnoea with polysomnography identify those at higher risk of postoperative complications?
- Does treating obstructive sleep apnoea perioperatively improve outcomes?

Why this is important

Obstructive sleep apnoea is a common condition, particularly in people who are obese, and is associated with adverse postoperative outcomes. However, it is frequently undiagnosed before surgery. Work is ongoing to examine whether obstructive sleep apnoea is associated with a variety of postoperative outcomes (morbidity, mortality, quality of life) in specific surgical populations. However, there is currently no robust evidence or any ongoing trials studying whether preoperative assessment and diagnosis of obstructive sleep apnoea leads to preoperative intervention or improved postoperative outcomes.

2 Glycated haemoglobin testing

Does optimisation of HbA1c in people with poorly controlled diabetes improve surgical outcomes?

Why this is important

Diabetes is the most common metabolic disorder in the UK and people with diabetes increasingly need surgical procedures. Diabetes leads to increased morbidity, length of stay and inpatient costs. Evidence suggests that doctors often fail to identify high-risk patients before surgery and do not provide perioperative interventions to control HbA1c levels. However, the impact of optimising HbA1c levels before surgery has not been assessed in a randomised clinical trial.

Update information

This guideline is an update of NICE guideline CG3 (published June 2003) and will replace it.

New recommendations and 1 research recommendation have been added for the following tests that were not included in the original guideline:

- echocardiography (resting)
- HbA1c testing
- polysomnography.

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