

1 **NATIONAL INSTITUTE FOR HEALTH AND CARE**
2 **EXCELLENCE**

3 **Guideline**

4 **Perioperative care in adults**

5 **Draft for consultation, December 2019**
6

This guideline covers care for adults having surgery, including dental surgery, from the time they are booked for surgery until they are discharged after surgery. It includes advice on information and support for people before they have surgery. The guideline also provides recommendations on preparing for surgery, keeping people safe during surgery and pain relief during recovery.

Who is it for?

- Healthcare professionals, including dentists, in primary, secondary and tertiary care
- Commissioners, planners and service providers, including those in non-NHS organisations commissioned to provide services for the NHS or local authorities
- Adults having surgery, their families and carers

This draft guideline contains:

- the draft recommendations
- recommendations for research
- rationale and impact sections that explain why the committee made the recommendations and how they might affect practice
- the guideline context.

Information about how the guideline was developed is on the [guideline's page](#) on the NICE website. This includes the evidence reviews, the scope, and details of the committee and any declarations of interest.

1 Contents

2	Recommendations	3
3	1.1 Information and support for people having surgery	3
4	1.2 Enhanced recovery programmes	4
5	1.3 Preoperative care	4
6	1.4 Intraoperative care	6
7	1.5 Postoperative care	8
8	1.6 Managing pain.....	8
9	Terms used in this guideline	10
10	Recommendations for research	11
11	Rationale and impact.....	12
12	Context.....	26
13	Finding more information and resources	26
14		

1 Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in [making decisions about your care](#).

[Making decisions using NICE guidelines](#) 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.

2 1.1 *Information and support for people having surgery*

3 **Single point of contact**

4 1.1.1 Allocate a single point of contact (such as a clinical nurse specialist or
5 surgical team) to each person having surgery. Ensure that the allocated
6 point of contact:

- 7 • remains the same throughout the person's surgical care whenever
- 8 possible
- 9 • is available before, during and after surgery to discuss queries or
- 10 concerns the person and their family and carers (as appropriate) have.

To find out why the committee made the recommendation on a single point of contact for people having surgery and how it might affect practice see [rationale and impact](#).

11

12 1.1.2 Follow [the recommendations on involvement of family members and](#)
13 [carers, communication, giving information and shared decision making in](#)
14 [the NICE guideline on patient experience in adult NHS services](#).

15 1.1.3 For people with a learning disability, follow [the recommendations on](#)
16 [communicating and making information accessible in the NICE guideline](#)
17 [on care and support of people growing older with learning disabilities](#).

1 **1.2** ***Enhanced recovery programmes***

2 1.2.1 Offer an enhanced recovery programme to people having elective [major](#)
3 [or complex](#) surgery.

4 1.2.2 Use an enhanced recovery programme that includes preoperative,
5 intraoperative and postoperative components.

To find out why the committee made the recommendations on enhanced recovery programmes and how they might affect practice see [rationale and impact](#).

6

7 **1.3** ***Preoperative care***

8 **Assessing the risks of surgery**

9 1.3.1 Use a validated risk stratification tool such as the Portsmouth
10 Physiological and Operative Severity Score for the enUmeration of
11 Mortality and morbidity (P-POSSUM), the American College of Surgeons
12 National Surgical Quality Improvement Programme surgical risk calculator
13 (ACS NSQIP) or the Estimation of Physiologic Ability and Surgical Stress
14 scoring system (E-PASS) to supplement clinical assessment when
15 planning surgery including dental surgery. Discuss the person's risks and
16 surgical options with them to allow for informed shared decision making.

To find out why the committee made the recommendation on assessing the risks of surgery and how it might affect practice, see [rationale and impact](#).

17

18 **Lifestyle modifications**

19 1.3.2 Discuss lifestyle modifications with people having surgery, for example
20 stopping smoking. Follow the relevant [NICE guidance on lifestyle and](#)
21 [wellbeing](#).

22 **Preoperative optimisation clinics for older people**

23 The committee were unable to make recommendations for practice in this area. They
24 made a [recommendation for research](#).

To find out why the committee were unable to make recommendations on preoperative optimisation clinics for older people see [rationale](#).

1

2 **Managing anaemia**

3 ***Iron supplementation***

4 1.3.3 For people with anaemia having surgery follow [the recommendations on](#)
5 [intravenous and oral iron in the NICE guideline on blood transfusion](#).

6 ***Oral iron regimens***

7 1.3.4 Consider an alternate-day oral iron regimen for people who have side
8 effects from taking oral iron every day.

9 ***When to start oral iron supplementation***

10 The committee were unable to make a recommendation in this area. They made a
11 [recommendation for research](#).

To find out why the committee were made the recommendation on oral iron regimens, and why they were not able to make a recommendation on when to start oral iron supplementation, see [rationale and impact](#).

12

13 1.3.5 Follow the recommendations in [the NICE guideline on medicines](#)
14 [adherence to encourage adherence to oral iron regimens](#).

15 **Reducing the risk of venous thromboembolism**

16 1.3.6 Follow [the recommendations on assessing and reducing the risk of](#)
17 [venous thromboembolism for people having surgery in the NICE guideline](#)
18 [on venous thromboembolism in over 16s](#).

19 ***Anticoagulation for people taking a vitamin K antagonist who need bridging*** 20 ***therapy***

21 The committee were unable to make recommendations for practice in this area. They
22 made a [recommendation for research](#).

To find out why the committee were unable to make recommendations on anticoagulation for people taking a vitamin K antagonist who need bridging therapy see [rationale](#).

1 **Nutritional assessment**

- 2 1.3.7 Offer preoperative nutritional assessment to people having [intermediate](#),
3 or [major or complex](#), surgery.

To find out why the committee made the recommendation on nutritional assessment and how it might affect practice, see [rationale and impact](#).

- 4 1.3.8 Follow [the recommendations on indications for nutrition support and what](#)
5 [to give in the NICE guideline on nutrition support for adults](#).

6 **1.4 Intraoperative care**

7 **Managing fluids**

8 **Oral fluids**

- 9 1.4.1 Tell people having surgery, including dental surgery, that:

10 they may drink clear fluids until 2 hours before their operation
11 drinking clear fluids before the operation can help reduce headaches, nausea and
12 vomiting afterwards
13 clear fluids are water, fruit juice without pulp, coffee or tea without milk and ice lollies.

- 14 1.4.2 Consider carbohydrate drinks before surgery for people having abdominal
15 [major or complex surgery](#).

16 **Intravenous fluids**

- 17 1.4.3 Consider using intravenous crystalloid for intraoperative fluid
18 maintenance.

- 19 1.4.4 Follow [the recommendations on resuscitation and routine maintenance in](#)
20 [the NICE guideline on intravenous fluid therapy in adults in hospital](#).

To find out why the committee made the recommendations on managing fluids and

how they might affect practice, see [rationale and impact](#).

1 **Monitoring**

2 ***Cardiac output monitoring***

3 1.4.5 Consider cardiac output monitoring for people having [major or complex](#), or
4 [high-risk](#), surgery.

5 ***Blood glucose control in hospital***

6 1.4.6 Do not aim for tight blood glucose control (4 to 6 mmol/litre) for people
7 having surgery unless they have type 1 diabetes (see
8 recommendation 1.4.7).

9 1.4.7 For people with type 1 diabetes follow [the recommendations on care of](#)
10 [adults with type 1 diabetes in hospital in the NICE guideline on type 1](#)
11 [diabetes in adults](#).

To find out why the committee made the recommendations on monitoring and how they might affect practice see [rationale and impact](#).

12 **Surgical safety checklists**

13 1.4.8 Ensure that the [WHO Surgical Safety Checklist](#) is completed for each
14 surgical procedure, including dental procedures.

15 1.4.9 Consider adding steps to the WHO Surgical Safety Checklist to eliminate
16 preventable events reported locally or nationally, such as those in NHS
17 Improvement's national patient safety alerts and surgical 'never events'.

To find out why the committee made the recommendations on surgical safety checklists and how they might affect practice see [rationale and impact](#).

18

1 **1.5** *Postoperative care*

2 **Specialist recovery areas**

3 1.5.1 Use specialist recovery areas for people who are having [major or complex](#)
4 or [high-risk](#) surgery, or who have a high risk of complications or mortality,
5 for example because of previous surgical history or comorbidities.

To find out why the committee made the recommendation on specialist recovery areas see [rationale and impact](#).

6

7 **1.6** *Managing pain*

8 **Planning pain management**

9 1.6.1 Discuss the options for postoperative pain management with people
10 before they have surgery, including dental surgery.

11 Take into account:

12 clinical features including comorbidities, renal and liver function, allergies, current
13 medicines and cognitive function
14 whether the surgery is immediate, urgent, expedited or elective.

15 Include in the discussion:

16 the likely impact of the procedure on the person's pain
17 the person's preferences and expectations
18 their pain history
19 the potential benefits and risks, including long-term risks, of different types of pain
20 relief
21 plans for discharge.

22 **Selecting analgesia**

23 1.6.2 Offer a multimodal approach in which analgesics from different classes
24 are combined to manage postoperative pain. Take into account the
25 factors listed in recommendation 1.6.1.

1 1.6.3 If controlled drugs are used follow [the recommendations in the NICE](#)
2 [guideline on controlled drugs: safe use and management](#).

3 ***Paracetamol***

4 1.6.4 Offer oral paracetamol before and after surgery, including dental surgery,
5 irrespective of pain severity.

6 1.6.5 Do not offer intravenous paracetamol unless the person cannot take oral
7 medicine.

8 ***Non-steroidal anti-inflammatory drugs (NSAIDs)***

9 1.6.6 Offer oral ibuprofen to manage [immediate postoperative pain](#) (including
10 pain after dental surgery), irrespective of pain severity, unless the person
11 has had surgery for hip fracture (see [the recommendations for analgesia](#)
12 [in the NICE guideline on hip fracture](#)).

13 1.6.7 Do not offer an intravenous NSAID to manage immediate postoperative
14 pain (including pain after dental surgery) unless the person cannot take
15 oral medicine.

16 1.6.8 If offering an intravenous NSAID to manage immediate postoperative
17 pain, choose a traditional NSAID rather than a COX-2 inhibitor.

18 ***Opioids***

19 1.6.9 Offer an oral opioid only if immediate postoperative pain is expected to be
20 moderate to severe. Give the opioid as soon as the person can eat and
21 drink after surgery.

22 Adjust the dose of oral opioid after surgery to help the person achieve functional
23 recovery (such as coughing and mobilising) as soon as possible.

24
25 1.6.10 For people who cannot take oral opioids, offer a choice of PCA (patient-
26 controlled analgesia) or a continuous epidural to relieve pain after surgery.

27 Take into account the benefits of a continuous epidural for people who:

28 are having major or complex open-torso surgery **or**

- 1 are expected to have severe pain **or**
2 have cognitive impairment.

3 ***Gabapentin***

- 4 1.6.11 Consider a single dose of gabapentin^{1, 2} immediately before or after
5 surgery to supplement other types of pain relief if the person's pain is
6 expected to be moderate to severe.

7 ***Intravenous ketamine***

- 8 1.6.12 Consider a single dose of intravenous ketamine³, given either during or
9 immediately after surgery, to supplement other types of pain relief if:
10 the person's pain is expected to be moderate to severe¹ and an intravenous opioid
11 alone does not provide adequate pain relief **or**
12 the person has opioid sensitivity.

To find out why the committee made the recommendations on managing pain and how they might affect practice see [rationale and impact](#).

13

14 ***Terms used in this guideline***

15 **High-risk surgery**

16 Surgery with a risk of mortality greater than 5%.

17 **Immediate postoperative pain**

18 Pain during the first 24 hours after surgery.

¹ At the time of consultation (December 2019) gabapentin did not have a UK marketing authorisation for perioperative pain relief. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's [Prescribing guidance: prescribing unlicensed medicines](#) for further information.

² As of 1 April 2019, gabapentin is a Class C controlled substance (under the Misuse of Drugs Act 1971) and scheduled under the Misuse of Drugs Regulations 2001 as Schedule 3. Evaluate patients carefully for a history of drug abuse before prescribing and observe patients for development of signs of abuse and dependence (MHRA, [Drug Safety Update April 2019](#)).

³ At the time of consultation (December 2019) intravenous ketamine did not have a UK marketing authorisation for perioperative pain relief. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's [Prescribing guidance: prescribing unlicensed medicines](#) for further information.

1 **Intermediate surgery**

2 Examples include primary repair of inguinal hernia, excising varicose veins in the leg,
3 tonsillectomy or adenotonsillectomy, and knee arthroscopy.

4 **Major or complex surgery**

5 Examples include total abdominal hysterectomy, endoscopic resection of prostate,
6 lumbar discectomy, thyroidectomy, total joint replacement, lung operations, colonic
7 resection and radical neck dissection.

8 **Minor surgery**

9 Examples include excising a skin lesion and draining a small abscess.

10 **Recommendations for research**

11 The guideline committee has made the following recommendations for research.

12 ***Key recommendations for research***

13 **1 Preoperative optimisation clinics for older people**

14 What is the clinical and cost effectiveness of preoperative optimisation clinics for
15 older people?

16 To find out why the committee made the research recommendation on
17 preoptimisation clinics see [rationale and impact](#).

18 **2 Oral iron supplementation**

19 For people with iron-deficiency anaemia, how long before surgery should oral iron
20 supplementation be started, and what is the clinical and cost effectiveness of daily
21 oral iron compared with oral iron given on alternate days?

22 To find out why the committee made the research recommendation on the timing
23 and frequency of oral iron supplementation see [rationale and impact](#).

1 **3 Managing anticoagulation treatment for people taking a vitamin K antagonist**
2 **who need bridging therapy**

3 What is the most clinically and cost-effective strategy for perioperative management
4 of anticoagulation treatment in people taking a vitamin K antagonist with a target INR
5 of more than 3 who need bridging therapy?

6 To find out why the committee made the research recommendation on
7 anticoagulation management see [rationale and impact](#).

8 **4 Enhanced recovery programmes**

9 What is the clinical and cost effectiveness of enhanced recovery programmes for
10 adults having major emergency surgery?

11 To find out why the committee made the research recommendation on enhanced
12 recovery programmes see [rationale and impact](#).

13 **5 Specialist recovery areas**

14 What is the clinical and cost effectiveness of postoperative recovery in specialist
15 areas, including intensive care, for adults in whom the benefit of care in an intensive
16 care unit, post-anaesthetic care unit or surgical ward is uncertain?

17 To find out why the committee made the research recommendation on specialist
18 recovery areas see [rationale and impact](#).

19 ***Other recommendations for research***

20 **Fasting**

21 What is the optimal timing of administration of carbohydrate drinks as part of a
22 preoperative fasting strategy?

23 **Rationale and impact**

24 These sections briefly explain why the committee made the recommendations and
25 how they might affect practice. They link to details of the evidence and a full
26 description of the committee's discussion.

1 ***Single point of contact for people having surgery***

2 [Recommendation 1.1.1](#)

3 **Why the committee made the recommendation**

4 Evidence from studies using patient focus groups and face-to-face interviews
5 showed that people place a high value on having information that is consistent and
6 available when they need it. Patients in these studies stressed the importance of
7 knowing who to contact if they have concerns or queries, particularly after discharge.
8 The studies also illustrated how people's information needs change before, during
9 and after surgery, with some postoperative patients reporting difficulty recalling
10 information given to them before surgery. The committee were in agreement that
11 their experience reflects the evidence. They also noted that people who feel well
12 informed about their surgery and recovery are less anxious than those who do not.

13 The committee agreed that their recommendation, together with the
14 recommendations in the NICE guidelines on patient experience in adult NHS
15 services, and care and support of people growing older with learning disabilities,
16 cover the information and support needed by adults during perioperative care.

17 **How the recommendation might affect practice**

18 Providing a single point of contact may be achieved in larger hospitals by allocating a
19 specific team member such as a clinical nurse specialist. In smaller units the point of
20 contact may need to be a team of people. In current practice the amount, availability
21 and sources of information for people having surgery all vary. This recommendation
22 is not expected to lead to major changes in practice.

23 Full details of the evidence and the committee's discussion are in [evidence review A:
24 information and support needs.](#)

25 [Return to recommendations](#)

1 ***Enhanced recovery programmes***

2 [Recommendations 1.2.1 and 1.2.2](#)

3 **Why the committee made the recommendations**

4 There was a large body of evidence showing that hospital stays are shorter,
5 postoperative complications less frequent and overall costs lower when people
6 having elective major surgery follow an enhanced recovery programme (ERP).

7 The committee agreed that, for optimum effectiveness, an ERP should span the
8 preoperative, intraoperative and postoperative stages. so recommended that
9 components covering all 3 stages be included. They acknowledged that the content
10 of ERP components will depend on the type of surgery so did not make
11 recommendations detailing the particulars of these components.

12 There is no evidence on the effectiveness of ERPs in emergency surgery, but the
13 committee thought they might be beneficial in this type of surgery as well. They
14 therefore made a [research recommendation](#).

15 **How the recommendations might affect practice**

16 According to the Perioperative Quality Improvement Programme (PQIP) 2017–18
17 annual report, 61% of patients enrolled in the PQIP were following an ERP. The
18 report noted that the use of ERPs varies across specialties and hospitals. To
19 implement this recommendation, specialties and hospitals that do not currently
20 provide an ERP covering all 3 stages of perioperative care for patients having major
21 elective surgery will need to restructure their surgical care. This might have an initial
22 resource impact, although some features of an ERP, such as early mobilisation and
23 early intake of food and fluids, are current practice in many hospitals. Introducing an
24 ERP can be expected to reduce the length of hospital stays and the incidence of
25 complications, thereby reducing overall costs.

26 Full details of the evidence and the committee's discussion are in [evidence review B:
27 enhanced recovery programmes](#).

28 [Return to recommendations](#)

1 ***Assessing the risks of surgery***

2 [Recommendation 1.3.1](#)

3 **Why the committee made the recommendation**

4 Validated preoperative risk stratification tools such as the examples listed in the
5 recommendation are freely available and can be completed rapidly. The committee
6 agreed that, although no risk stratification tool is 100% accurate, the evidence
7 showed that validated tools are sufficiently accurate to be a useful supplement to
8 clinical assessment.

9 The committee noted that a validated risk stratification tool can also help to frame
10 discussions about risk with the person having surgery. They agreed that the risk of
11 postoperative morbidity is an important concern for people when they are making
12 decisions about surgery.

13 **How the recommendation might affect practice**

14 Preoperative risk stratification tools are commonly used in current practice and the
15 recommendation is not expected to change practice.

16 Full details of the evidence and the committee's discussion are in [evidence review C:
17 preoperative risk stratification tools](#).

18 [Return to recommendations](#)

19 ***Preoperative optimisation clinics for older people***

20 **Why the committee were unable to make a recommendation**

21 Preoperative optimisation clinics for older people are designed to reduce
22 complications and deaths associated with surgery by proactively addressing risk
23 factors identified during the preoperative assessment. These clinics are not available
24 in all areas and are expensive to establish. Although a small number of studies
25 suggested a possible improvement in surgical outcomes, the evidence was
26 inconclusive. The committee decided that, because of the high cost and lack of clear
27 evidence, they could not make a recommendation on these clinics. However, they
28 agreed that this is an important area and made a recommendation for research.

1 Full details of the evidence and the committee's discussion are in [evidence review D:](#)
2 [preoperative optimisation clinics.](#)

3 [Return to recommendations](#)

4 ***Oral iron regimens***

5 Recommendation 1.3.4

6 **Why the committee made the recommendation**

7 Oral iron supplements are usually taken daily but some people have unpleasant side
8 effects from daily iron. The committee thought that, for these people, switching to an
9 alternate-day regimen should be considered as a means of reducing side effects and
10 encouraging adherence. They noted that this potential benefit needs to be balanced
11 against the potential risk that an alternate-day regimen might be more complicated
12 for people taking multiple daily medicines. There was no evidence on the
13 comparative effectiveness of daily and alternate-day oral iron regimens.

14 ***When to start oral iron supplementation***

15 In all of the studies iron supplementation had been started about 3 weeks before
16 surgery. In current practice this varies. There were no studies that compared
17 different starting times so the committee were unable to determine the best time to
18 start iron therapy before surgery.

19 The committee made a [recommendation for research](#) on oral iron supplementation.

20 **How the recommendation might affect practice**

21 The option to consider switching from a daily to an alternate-day regimen might
22 increase adherence to oral iron therapy in people who have unpleasant side effects
23 from daily iron. This has the potential to reduce the need for blood transfusions and
24 improve surgical outcomes for this group of people.

25 Full details of the evidence and the committee's discussion are in [evidence review E:](#)
26 [preoperative management of anaemia.](#)

27 [Return to recommendations](#)

1 ***Anticoagulation for people taking a vitamin K antagonist who need***
2 ***bridging therapy***

3 **Why the committee were unable to make recommendations**

4 People who take a vitamin K antagonist are at high risk of venous thromboembolism
5 or stroke and therefore it is usual practice to provide bridging anticoagulation during
6 surgery with either subcutaneous low molecular weight heparin (LMWH) or
7 intravenous unfractionated heparin (UFH). No clinical evidence was identified
8 comparing LMWH with UFH in this high-risk group of patients. The committee noted
9 that people who take a vitamin K antagonist with a target INR of more than 3 and
10 who need bridging therapy are a small proportion of the population taking vitamin K
11 antagonists, and that many of these people have mechanical heart valves. Because
12 of the lack of evidence the committee made a [research recommendation](#).

13 Full details of the evidence and the committee's discussion are in [evidence review F:](#)
14 [management of anticoagulant medication](#).

15 [Return to recommendations](#)

16 ***Nutritional assessment***

17 [Recommendation 1.3.7](#)

18 **Why the committee made the recommendation**

19 No evidence on nutritional assessment was available. The committee noted that
20 nutritional deficiency contributes to reduced physiological resilience, which is
21 associated with increased complications and perioperative mortality. Because of this,
22 they agreed that a preoperative nutritional assessment is useful for people having
23 intermediate, major or complex surgery.

24 **How the recommendation might affect practice**

25 Preoperative nutritional assessment for intermediate, major or complex surgery is
26 current practice and the recommendation is not expected to lead to changes in
27 practice.

1 Full details of the evidence and the committee's discussion are in [evidence review G:](#)
2 [nutritional screening in preoperative assessment](#).

3 [Return to recommendations](#)

4 ***Managing fluids***

5 [Recommendations 1.4.1 to 1.4.4](#)

6 **Why the committee made the recommendations**

7 ***Oral fluids***

8 Some evidence showed that drinking water until 2 hours before surgery reduces
9 postoperative headaches, nausea and vomiting. The committee noted that many
10 patients are not aware of this and that there is a widespread belief that fluids should
11 be avoided before surgery. They agreed that there was sufficient evidence to
12 recommend drinking clear fluids before surgery, and that the benefits should be
13 explained to patients.

14 There was not enough evidence to justify the routine use of preoperative
15 carbohydrate drinks for most types of surgery. A small amount of evidence
16 suggested reductions in postoperative thirst and headache in people given a
17 carbohydrate drink before surgery. However, the evidence did not show any
18 substantial benefits in terms of patient satisfaction or the occurrence of other side
19 effects.

20 The committee noted that people having major abdominal surgery may need longer
21 postoperative fasting periods and therefore might benefit more than others from
22 preoperative carbohydrate drinks. Some evidence also suggested that length of
23 hospital stay after major abdominal surgery is reduced in people given a
24 preoperative carbohydrate drink. For these reasons the committee agreed that
25 carbohydrate drinks could be considered for people having this type of surgery.

26 There was no evidence on the best time to give preoperative carbohydrate drinks or
27 clear fluids so the committee made a [research recommendation](#).

1 ***Intravenous fluids***

2 A small amount of evidence suggested a possible reduction in mortality when
3 intravenous crystalloid, rather than colloid, is used for intraoperative fluid
4 management. However, there was also evidence showing that crystalloids resulted
5 in a clinically important increase in nausea and vomiting. The committee were aware
6 that crystalloid use has become more common after reports of increased risks of
7 acute kidney injury, coagulopathy and mortality with colloid. They also noted that
8 crystalloid is less expensive than colloid. They concluded that crystalloid should be
9 considered for intraoperative fluid maintenance.

10 **How the recommendations might affect practice**

11 ***Oral fluids***

12 Current clinical practice on allowing oral fluids before surgery varies, with some
13 services offering carbohydrate drinks before surgery, some allowing clear fluids until
14 2 to 4 hours before surgery, and others advising people to fast from midnight before
15 surgery. The committee noted that more centres are moving away from traditional
16 preoperative fasting regimens and using the more liberal regimen of clear fluids up to
17 2 hours before surgery. This recommendation is expected to increase the number of
18 services adopting more liberal regimens.

19 ***Intravenous fluids***

20 The use of intravenous crystalloid for intraoperative fluid maintenance reflects
21 current practice and is not expected to result in a change in practice.

22 Full details of the evidence and the committee's discussion are in [evidence review H:
23 preoperative fasting](#) and [evidence review I: intravenous fluid management strategy](#).

24 [Return to recommendations](#)

1 ***Monitoring***

2 [Recommendations 1.4.5 and 1.4.6](#)

3 **Why the committee made the recommendations**

4 ***Cardiac output monitoring***

5 Older evidence suggested that cardiac output monitoring reduces some
6 complications. However, the relevance of this evidence to current practice was
7 unclear because of subsequent improvements in perioperative care such as better
8 preoperative risk assessment and advancements in surgical techniques. More recent
9 evidence also supported the use of cardiac output monitoring to reduce
10 complications, but this evidence was from one small study. The committee agreed
11 that cardiac output monitoring should be considered on a case-by-case basis.

12 ***Blood glucose control in hospital***

13 There was no evidence that tight blood glucose control in hospital improves
14 outcomes for people without type 1 diabetes. In addition, there is evidence
15 suggesting that tight blood glucose control increases episodes of hypoglycaemia.
16 The committee therefore concluded that tight blood glucose control is not necessary
17 for people without type 1 diabetes.

18 **How the recommendations might affect practice**

19 ***Cardiac output monitoring***

20 The recommendation on cardiac output monitoring reflects current practice and is
21 not expected to lead to major changes in practice.

22 ***Blood glucose control in hospital***

23 Blood glucose control varies in current practice, although there has been a shift
24 away from tight control because of concerns about hypoglycaemic events. The
25 recommendation is expected to change practice in services that still use tight blood
26 glucose control for people without type 1 diabetes. It may also prevent operations
27 being cancelled unnecessarily on the basis of blood glucose levels.

1 Full details of the evidence and the committee’s discussion are in [evidence review J: non-invasive cardiac output monitoring](#) and [evidence review K: blood glucose control management](#)

4 [Return to recommendations](#)

5 ***Surgical safety checklists***

6 [Recommendations 1.4.8 and 1.4.9](#)

7 **Why the committee made the recommendations**

8 Evidence showed that using the WHO Surgical Safety Checklist (SSC) reduces
9 complications and mortality. Although the SSC is mandatory in NHS practice, the
10 committee were aware from their experience that completion of the checklist varies.
11 They reasoned that the occurrence of preventable ‘never events’ could be
12 associated with this variation in completion of the SSC. They therefore decided to
13 make a recommendation to highlight the importance of completing the SSC.

14 In the committee’s view, reducing ‘never events’ should be a primary focus of
15 surgical safety checklists. They agreed that modifying the SSC could help to achieve
16 this and should be considered whenever relevant events are reported.

17 **How the recommendations might affect practice**

18 The recommendations are expected to reinforce use of the SSC in current practice.
19 Incorporating measures to address risks highlighted in national patient safety alerts
20 and ‘never events’ reports is expected to reduce the number of preventable ‘never
21 events’ that occur.

22 Full details of the evidence and the committee’s discussion are in [evidence review L: management systems to promote safety in operating theatres](#).

24 [Return to recommendations](#)

25 ***Specialist recovery areas***

26 [Recommendation 1.5.1](#)

1 **Why the committee made the recommendation**

2 The committee agreed that people with a high risk of complications or mortality
3 should have postoperative care in a specialist recovery area to improve outcomes
4 such as quality of life and to reduce the incidence of adverse events . However, they
5 noted that there are people in whom the need for a specialist recovery area is less
6 clear, and made a [research recommendation](#).

7 **How the recommendation might affect practice**

8 The recommendation is expected to lead to a need for increased capacity and staff
9 in hospitals performing major or complex surgery, or surgery in patients with a high
10 risk of complications or mortality. The resource impact for the NHS is likely to be
11 significant because of the high cost of care in specialist recovery areas and the large
12 number of patients likely to need this care. However, there may also be savings
13 achieved by reducing the occurrence of postoperative adverse events and the need
14 to manage these.

15 Full details of the evidence and the committee's discussion are in [evidence review](#)
16 [M: postoperative recovery in specialist areas](#).

17 [Return to recommendations](#)

18 ***Managing pain***

19 [Recommendations 1.6.1 to 1.6.14](#)

20 **Why the committee made the recommendations**

21 ***Planning pain management***

22 Based on their experience, the committee agreed that people having surgery should
23 be informed of the options for pain management and be actively involved in choosing
24 their own pain management whenever possible.

25 ***Selecting analgesia***

26 The committee agreed, based on their experience, that multimodal analgesia
27 provides more effective pain relief and reduces the need for opioids and the
28 occurrence of opioid-related complications.

1 ***Paracetamol***

2 Some evidence suggested that paracetamol used alongside opioid analgesia
3 reduces the amount of opioid needed to manage pain. The committee therefore
4 agreed that paracetamol is beneficial in reducing opioid consumption. There was no
5 evidence showing a significant difference in effectiveness between oral and
6 intravenous paracetamol. Because intravenous paracetamol is much more
7 expensive, the committee saw no reason to recommend it for people who can take
8 oral medicines.

9 ***NSAIDs***

10 The evidence showed that NSAIDs provide effective additional pain relief, reducing
11 the amount of other types of analgesia needed. Traditional NSAIDs are more cost
12 effective than COX-2 inhibitors, and oral ibuprofen is the most cost effective
13 traditional NSAID. There was no evidence showing a significant difference in
14 effectiveness between NSAIDs or routes of administration. Because intravenous
15 NSAIDs are more expensive, the committee saw no reason to recommend them for
16 people who can take oral medicines.

17 ***Opioids***

18 There was no evidence showing a significant difference in effectiveness between
19 oral and intravenous opioids. Intravenous opioids are more expensive, so the
20 committee saw no reason to recommend them for people who can take oral
21 medicines.

22 For people who are not able to take an oral opioid, the committee agreed that a
23 choice of PCA or epidural should be offered because there was no evidence
24 favouring either mode of administration for most people having surgery. An
25 exception is the group having major, complex open-torso surgery, who may benefit
26 from the early pain relief provided by a continuous epidural. The committee pointed
27 out that factors such as patient preference and ability to use a PCA pump effectively
28 should be taken into account when choosing between PCA and continuous epidural.
29 The committee looked at the possible benefits of spinal administration and agreed
30 that there was insufficient evidence to support a recommendation.

31 ***Gabapentin***

1 Evidence showed that gabapentin can reduce the dose of opioid needed for pain
2 relief. Studies comparing gabapentin with pregabalin showed some evidence that
3 gabapentin is more effective at relieving pain than pregabalin. The evidence did not
4 show an increase in episodes of dizziness with short-term use of neuropathic nerve
5 stabilisers such as gabapentin. The committee concluded that a single dose of
6 gabapentin can be considered to supplement other pain relief if needed.

7 ***Intravenous ketamine***

8 There was evidence showing that adding intravenous ketamine to an intravenous
9 opioid can reduce both pain and opioid consumption. The committee noted that
10 ketamine has an additive analgesic effect. They agreed, based on their experience,
11 that intravenous ketamine is helpful if an intravenous opioid alone does not provide
12 adequate pain relief, or if the person is opioid sensitive (abnormal pain sensitivity),
13 and can be considered in these situations.

14 **How the recommendations might affect practice**

15 ***Planning pain management***

16 The committee noted that pain management is usually planned during a preoperative
17 assessment. Although preoperative assessments are standard in current practice,
18 actively involving the person in decisions about their pain management may lead to a
19 small increase in staff time required.

20 ***Selecting analgesia***

21 A multimodal approach is current practice and the recommendation is not expected
22 to change this.

23 ***Paracetamol***

24 The recommendations can be expected to result in cost savings by reducing the use
25 of intravenous paracetamol. They are also expected to lead to dose reductions in
26 opioid analgesia, resulting in fewer side effects from opioid consumption.

27 ***NSAIDs***

28 Concerns about cardiac and renal complications have limited the use of NSAIDs in
29 people having surgery. These recommendations can be expected to change practice

1 by increasing the use of short courses of traditional oral NSAIDs for people having
2 surgery.

3 ***Opioids***

4 Intravenous opioid administration is often used in current practice because it is
5 perceived to be more convenient and offer better pain relief. The recommendations
6 are expected to lead to a change in this practice, with a reduction in intravenous
7 opioid administration and a concomitant increase in the use of oral opioids.

8 PCA and continuous epidurals are used routinely in current practice, although there
9 are variations in their use across services.

10 As these recommendations are for the perioperative period only an opiate withdrawal
11 plan is not necessary, but one would need to be considered if opioids were used in
12 the longer-term.

13 This recommendation is not expected to lead to major changes in practice.

14 ***Gabapentin***

15 Neuropathic nerve stabilisers such as gabapentin are often avoided because of
16 concerns about dizziness and nausea. This recommendation might lead to an
17 increase in the use of single doses of gabapentin immediately before and after
18 surgery.

19 ***Intravenous ketamine***

20 The use of intravenous ketamine in postoperative pain management has increased
21 in recent years. Although ketamine is more expensive than other analgesics, the
22 recommendation is not expected to have a significant impact because it is restricted
23 to a single dose and only one-third of people having surgery are expected to
24 experience moderate to severe pain.

25 Full details of the evidence and the committee's discussion are in:

- 26 • [evidence review A: information and support needs](#)
- 27 • [evidence review N1: managing acute postoperative pain.](#)

28 [Return to recommendations](#)

1 **Context**

2 Approximately 11 million people have surgery each year in the NHS. Over half are
3 having elective (non-emergency) procedures. Although the standard of care during
4 surgery is high, preventable complications and deaths still occur. Most of these are
5 in high-risk patients, who make up 15% of all patients having surgery.

6 Much progress has been made in improving surgical outcomes, but challenges in
7 optimising care for people having surgery remain. The field of perioperative care is
8 large and the evidence base for practice is small. This guideline brings together the
9 available evidence and provides standardised recommendations aimed at reducing
10 risk and improving outcomes. It also recommends areas where research is needed
11 to shed light on unanswered areas and clinical conundrums. The guideline is
12 expected to produce improvements in a number of areas which, when taken
13 together, will make surgery safer for everyone.

14 **Finding more information and resources**

15 To find out what NICE has said on topics related to this guideline, see our web page
16 on [surgical care](#).

17 © NICE 2019. All rights reserved. Subject to [Notice of rights](#).