PREOPERATIVE BLEEDING RISK ASSESSMENT TOOL

Guidance for Australian Health Providers

June 2015
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The content obtained from this document or derivative of this work must be attributed as the Preoperative Bleeding Risk Assessment.

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Acknowledgement
The NBA has commissioned the development of a suite of patient blood management (PBM) tools by various stakeholders as outlined by the PBM Guideline Implementation Strategy. The tools are intended to be used as a resource for health professionals to use in implementing the recommendations and practice points in the PBM Guidelines.
The Preoperative Bleeding Risk Assessment and Intervention Resource is intended to assist healthcare professionals in assessing and managing the risk of bleeding in a preoperative patient. Assessment of bleeding risk is a key component of patient blood management strategies to minimise blood loss. Patients may be at increased risk of bleeding for a number of reasons, including hereditary or acquired bleeding disorders, medical conditions such as liver disease, and medications including complementary medicines.

This resource was project managed by the Transfusion Practice and Education Team at the Blood Service.
PREOPERATIVE BLEEDING RISK ASSESSMENT AND INTERVENTION RESOURCE: QUICK REFERENCE GUIDE

Medication history:
- Use of medications which might affect bleeding eg. antiplatelet agents or anticoagulants; complementary medicines

Bleeding History including:
- Personal history of bleeding disorder or excessive bleeding
- Family history of bleeding disorder or excessive bleeding
- Comorbidities which may increase bleeding risk eg. bone marrow, renal or liver disorder

Physical examination:
- Signs of bleeding eg. petechiae, purpura, ecchymoses, haematomas,
- Signs of increased risk of bleeding eg. jaundice, splenomegaly, arthropathy, joint and skin laxity

Bleeding Assessment Tool*
- Aspirin NSAIDs Complementary meds Warfarin - minor procedures Manage as per evidence based guidelines
- Warfarin Clopidogrel New oral anticoagulants Dual antiplatelet therapy Multidisciplinary assessment and/or refer to specialist guidelines
- Either or both Positive

All negative
- No further evaluation required

Positive

Assessing and managing the risk of bleeding in a preoperative patient can be achieved by following the key steps:

1. **Review medications, including complementary therapies:**
   - Manage as per evidence based guidelines, including specialist guidelines, local protocols or referral where appropriate;

2. **Perform initial bleeding history including personal and family history of bleeding disorder or excessive bleeding; and comorbidities which may increase bleeding risk:**
   - If positive use a Bleeding Assessment Tool (BAT) consisting of a standardised bleeding questionnaire and bleeding score and/or refer for further assessment;

3. **Perform a physical examination:**
   - If positive for signs of bleeding or comorbidities associated with increased risk of bleeding use a BAT and/or refer for further assessment;

4. **If all initial screens are negative, no further evaluation is required – routine preoperative coagulation screening is not recommended;**

5. **Neither preoperative point-of-care (POC) global coagulation assays nor POC INR measurement predict bleeding tendency;**

6. **Refer for specialist and/or multidisciplinary assessment and management, patients:**
   - undergoing high risk procedures;
   - with haemostatic abnormalities associated with comorbid illness;
   - on multiple antiplatelet and/or anticoagulant therapy; and those
   - with known congenital bleeding disorders.

Details regarding these steps are outlined in the following pages. Considerations for incorporation of bleeding risk assessment into clinical practice using clinical practice improvement (CPI) methodologies can be found in Appendix 1.
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Assessment of bleeding risk is a key component of patient blood management strategies to minimise blood loss. Patients may be at increased risk of bleeding for a number of reasons, including:

- advanced age
- decreased preoperative red blood cell volume (small body size and/or preoperative anaemia)
- medications affecting haemostasis including complementary medicines
- medical conditions causing haemostatic defect including both hereditary bleeding disorders, and acquired medical conditions such as chronic kidney or liver disease, and
- type of surgery

Preoperative assessment of bleeding risk consists of administering a structured bleeding questionnaire which, in conjunction with physical examination, will guide laboratory testing. In the vast majority of cases a positive bleeding history will require referral for specialist assessment and management. Conversely, a negative initial screen and examination may exclude patients from further evaluation. Routine coagulation screening prior to surgery or other invasive procedures to predict postoperative bleeding in unselected patients is not recommended. The key recommendations from the British Committee for Standards in Haematology (BCSH) Guidelines on the assessment of bleeding risk prior to surgery or invasive procedures, and from the European Society of Anaesthesiology Management of severe perioperative bleeding: guidelines are outlined in Tables 1 and 2. Figure 1 demonstrates the key components of preoperative assessment of bleeding risk.

### Table 1: British Committee for Standards in Haematology recommendations on the assessment of bleeding risk prior to surgery or invasive procedures

| 1. | Indiscriminate coagulation screening prior to surgery or other invasive procedures to predict postoperative bleeding in unselected patients is not recommended. (Grade B, Level III). |
| 2. | A bleeding history including detail of family history, previous excessive post-traumatic or postsurgical bleeding and use of anti-thrombotic drugs should be taken in all patients preoperatively and prior to invasive procedures. (Grade C, Level IV). |
| 3. | If the bleeding history is negative, no further coagulation testing is indicated. (Grade C, Level IV). |
| 4. | If the bleeding history is positive or there is a clear clinical indication (e.g. liver disease), a comprehensive assessment, guided by the clinical features is required. (Grade C, Level IV). |

*For classification of evidence and recommendation levels see Appendix 2a.*
Table 2: Management of severe perioperative bleeding: guidelines from the European Society of Anaesthesiology

Evaluation of coagulation status:

- We recommend the use of a structured patient interview or questionnaire before surgery or invasive procedures, which considers clinical and family bleeding history and detailed information on the patient’s medication. 1C
- We recommend the use of standardised questionnaires on bleeding and drug history as preferable to the routine use of conventional coagulation screening tests such as a PTT, PT and platelet count in elective surgery. 1C

b For grades of recommendation – GRADES system see Appendix 2b.

Figure 1: Preoperative assessment of bleeding risk
MEDICATION ASSESSMENT

Numerous medications and complementary therapies may affect haemostasis so a comprehensive list of what the patient is taking is required. For information on discussing the use of complementary medicines with patients, refer to the NHMRC resource: Talking with your patients about Complementary Medicine – a Resource for Clinicians.\(^4\) The management of antiplatelet agents including non-steroidal anti-inflammatory agents, aspirin and clopidogrel; and anticoagulant therapy including warfarin, heparin and the new oral anticoagulants (NOAC) will need to be tailored for each patient to balance the risk of bleeding and thrombotic events. The management plan needs to take into consideration the indications for the medications, the nature of the procedure and its risk of bleeding. A multidisciplinary team approach, involving surgeon, anaesthetist, cardiologist, haematologist, preadmission staff, clinical nurse consultant and pharmacist may be necessary to develop a management plan appropriate for the patient.

Some guidance regarding management of patients on anticoagulant and antiplatelet agents is provided in the PBM guidelines: Module 2 – Perioperative\(^5\) as outlined in Table 3. The Australian Society of Thrombosis and Haemostasis (ASTH) have published practical guidance on the management of patients taking NOAC in the perioperative period.\(^6\) Figure 2 outlines the ASTH suggested management of patients receiving NOAC requiring urgent surgery and Table 4 includes a suggested management approach for preoperative interruption of NOAC. A summary of additional relevant medication guidance from the European Society of Anaesthesiology is available in Appendix 3.

Additional sources to assist management include:

- **Consensus guidelines for warfarin reversal**: Australasian Society of Thrombosis and Haemostasis, 2013;\(^7\)
- **The perioperative management of antithrombotic therapy**: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition), 2008;\(^8\)
- **New oral anticoagulants: a practical guide on prescription, laboratory testing and peri-procedural/bleeding management**: Australasian Society of Thrombosis and Haemostasis, 2014;\(^4\)
- **Management of severe perioperative bleeding**: guidelines from the European Society of Anaesthesiology, 2013;\(^3\) and
- **Guideline on the management of bleeding in patients on antithrombotic agents**: British Committee for Standards in Haematology, 2008;\(^9\)
Table 3: Guidance regarding cessation of medications - Patient Blood Management Guidelines: Module 2 Perioperative

<table>
<thead>
<tr>
<th>Medication</th>
<th>Recommendation (R)/Practice point (PP)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>In patients undergoing noncardiac surgery, it is reasonable to continue low dose aspirin therapy. This may require specific evaluation in neurosurgery and intraocular surgery (Grade C).</td>
<td>R8</td>
</tr>
<tr>
<td></td>
<td>In patients undergoing cardiac surgery, aspirin may be continued until the time of surgery.</td>
<td>PP8</td>
</tr>
<tr>
<td>Non-steroidal anti-inflammatories (NSAIDs)</td>
<td>In patients undergoing elective orthopaedic surgery, NSAID therapy should be ceased preoperatively to reduce blood loss and transfusion. The timing of the cessation should reflect the agent’s pharmacology (Grade C).</td>
<td>R9</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>In patients undergoing CABG either with or without CPB (OPCAB), clopidogrel therapy should be stopped, where possible, at least 5 days before surgery (Grade C).</td>
<td>R7</td>
</tr>
<tr>
<td></td>
<td>In patients receiving clopidogrel who are scheduled for elective noncardiac surgery or other invasive procedures, a multidisciplinary approach should be used to decide whether to cease therapy or defer surgery, balancing the risk of bleeding and thrombotic events. Specific evaluation is required for patients who had a recent stroke, or received a drug−eluting stent within the last 12 months or a bare metal stent within the last 6 weeks. If a decision is made to cease therapy preoperatively, this should occur 7−10 days before surgery.</td>
<td>PP9</td>
</tr>
<tr>
<td>Warfarin</td>
<td>In patients undergoing minor dental procedures, arthrocentesis, cataract surgery, upper gastrointestinal endoscopy without biopsy or colonoscopy without biopsy, warfarin may be continued (Grade B).</td>
<td>R10</td>
</tr>
<tr>
<td></td>
<td>In patients receiving warfarin who are scheduled for elective noncardiac surgery or other invasive procedures (excluding minor procedures – see Recommendation 10); specific management according to current guidelines is required (e.g. guidelines from the American College of Chest Physicians and the Australasian Society of Thrombosis and Haemostasis).</td>
<td>PP10</td>
</tr>
</tbody>
</table>

*For explanation of terminology for Recommendation and Practice point refer to Appendix 2c.*
Figure 2: Suggested management of patients receiving NOAC requiring urgent surgery
(Reproduced with permission)

![Flowchart showing suggested management of patients receiving NOAC requiring urgent surgery.](image-url)

- **aPCC** – activated prothrombin complex concentrate
- **3F-PCC** – three factor prothrombin complex concentrate
BLEEDING HISTORY

The use of a structured patient interview or questionnaire before surgery or invasive procedures to assess bleeding risk has been recommended in international guidelines.²,³ This should include personal and family bleeding history, including previous excessive post-traumatic or postsurgical bleeding; history of comorbidities which may increase bleeding risk such as renal or liver disorders; and detailed information on the patient’s medication including complementary medications.²,³ A number of Bleeding Assessment Tools (BATs) are available for this purpose and are outlined in Table 5.

WHAT IS A BLEEDING ASSESSMENT TOOL (BAT)?

The evaluation of bleeding symptoms is a well-recognised challenge for both patients and physicians because the reporting and interpretation of bleeding symptoms is subjective.¹⁰,¹¹ Mild bleeding events are commonly reported by patients both with and without inherited bleeding disorders.¹¹ Additionally, there are diagnostic limitations with available laboratory testing for mild bleeding disorders.¹⁰ As a result, bleeding assessment tools (BATs) have been developed and studied in a variety of clinical settings in an attempt to standardise and quantify bleeding symptoms. The goal of a BAT is to:

- improve diagnostic accuracy and thereby avoid unwarranted laboratory testing;
- predict the risk of bleeding in an individual patient;
- describe the symptom severity; and
- inform treatment.¹⁰

BATs consist of a clinician administered, standardised bleeding history questionnaire and a bleeding score. The worst episode of each symptom is graded according to the bleeding score table. The final bleeding score is the total of all values. The higher the bleeding score, the greater the likelihood of a bleeding disorder.
WHAT BLEEDING ASSESSMENT TOOLS ARE AVAILABLE?

Both adult and paediatric BATs are available, as well as a newer combined tool developed by the International Society of Thrombosis and Haemostasis (ISTH) in an effort to consolidate the available tools. All the tools stem from a set of provisional criteria for the diagnosis of von Willebrand Disease (VWD) type 1, published in 2005. The tools are referenced in Table 5.

In addition to the tools there are two excellent articles which provide an overview of the available BATs:

Rydz N and James PD. The evolution and value of bleeding assessment tools. Journal of Thrombosis and Haemostasis, 2012; 10: 2223–2229. (This article includes a Comparison of Scoring Systems).

<table>
<thead>
<tr>
<th>Tool</th>
<th>Reference and links to questionnaire and bleeding score</th>
<th>Estimated completion time</th>
</tr>
</thead>
</table>
USE OF BATS IN THE CLINICAL SETTING

BATs have been predominantly used and validated as research tools to identify patients with VWD. More studies of their use for diagnoses of mild bleeding disorders other than VWD are required. Platelet function disorders present a particular challenge due to a lack of a standardised approach to interpretation of platelet function testing. BATs have never been intended for use in severe bleeding disorders such as haemophilia. The instruments are designed to be administered by trained clinicians – further study would be required to assess the applicability of self-reporting of symptoms. An exact cut-off for an abnormal score has not been established and appears to vary depending on patient age, gender and the clinical setting.

The clinical utility of bleeding scores lies in their ability to summarise a great deal of clinical information about a patient to aid communication between clinicians and to assist in the prioritisation of laboratory testing. In the primary care and even haematology settings, the greatest clinical utility lies in their high negative predictive value and perhaps the greatest value is in the identification of patients for whom VWF testing is not necessary.

It is important to note that bleeding history may be negative in paediatric patients due to lack of haemostatic challenges. Therefore, if a positive family history exists, some laboratory workup will be required to confirm or exclude a bleeding disorder.

The ASH 2012 updated Quick Reference. Clinical Practice Guideline on the Evaluation and Management of von Willebrand Disease VWD is an example of the use of a BAT in clinical practice. It starts with three initial broad screening questions. If a positive result is obtained, the Condensed MCMDM-1 VWD Bleeding Questionnaire and Bleeding score are administered. Physical examination is required and if either history or examination is positive an assessment algorithm provides guidance on testing.

APPLICATION OF BATS IN THE PREOPERATIVE SETTING

The British Committee for Standards in Haematology recommends a bleeding history be taken in all patients preoperatively and prior to invasive procedures. The European Society of Anaesthesiology specifically recommends the use of a structured patient interview or questionnaire before surgery or invasive procedures. Both recommendations state the need for both clinical and family history of bleeding, and details of medications which may impact on bleeding.
PATIENTS WITH CONGENITAL BLEEDING DISORDERS

Pre-operative assessment and surgery in patients with known or suspected Von Willebrand disease, platelet defects, Haemophilia A and B or other rare bleeding disorders should whenever possible be undertaken in a hospital with a Haemophilia Treatment Centre or in close consultation with a haematologist in a Haemophilia Treatment Centre.

PATIENTS WITH COMORBIDITIES INVOLVING HAEMOSTATIC DERANGEMENT

Specialist guidelines or haematology advice should be sought for at-risk patients with severe thrombocytopaenia or coagulopathy. The European Society of Anaesthesiology (ESA) suggest that patients with haemostatic derangements associated with systemic, metabolic and/or endocrine diseases should be managed perioperatively in collaboration with a haematologist.

PHYSICAL EXAMINATION TO ASSESS BLEEDING RISK

Physical examination should be performed as a second step, focusing on signs of bleeding and diseases which may cause haemostatic failure (e.g. liver disease). Gender, body mass index and comorbidities including arterial hypertension, diabetes mellitus and renal dysfunction are independent risk factors for bleeding and transfusion.

Evidence of bleeding or anaemia, including size, location, and distribution of ecchymoses, haematomas, and petechiae should be sought. Evidence of risks of increased bleeding such as jaundice or spider angiomata, splenomegaly, arthropathy, joint and skin laxity, and telangiectasia should also be assessed.
When assessing bleeding risk the type of surgery requires consideration (Table 6).

### Table 6: Type of surgery and bleeding risk

<table>
<thead>
<tr>
<th>Type of surgery</th>
<th>Considerations</th>
<th>Suggested action</th>
</tr>
</thead>
</table>
| Thoracic or abdominal procedures       | Carry particular risks if:  
   - lasting > 2 hours  
   - blood loss > 500 mL                                                                 | May require laboratory analysis for bleeding risk stratification³                |
| Intracranial, intraocular and neuraxial procedures | Severe bleeding with the need for allogeneic blood transfusion is relatively uncommon in neurosurgery. However, haematoma growth has a major impact on neurological outcomes and mortality in patients with intracerebral haemorrhage (ICH). | Specialist guidelines or haematology advice should be sought for at-risk patients⁵  
   - Treat ICH early.³                                                                  |
| Cardiovascular surgery                 | Complex cardiovascular surgery may be accompanied by major blood loss, which can lead to loss and consumption of coagulation factors and haemodilution  
   - Coagulopathy in cardiac surgery patients may be exacerbated by concurrent antithrombotic therapy, extracorporeal circulation, hypothermia and volume replacement using crystalloids/colloids.³  
   - Failure to restore haemostasis and restrict perioperative bleeding increases the risk of re-exploration, transfusion requirements, ICU length of stay, morbidity and mortality.³ | Multidisciplinary assessment and/or referral to specialist guidelines             |
| Gynaecological cancer surgery          | Tendency to increased blood viscosity and fibrinogen concentrations, and perioperative transfusion > 2 L increases the risk of postoperative venous thromboembolism. | Perioperative haemostatic monitoring and intervention is critical.³               |
| Obstetric surgery                      | Obstetric patients with conditions that are likely to result in surgery will require multidisciplinary assessment and management. | Refer to Patient Blood Management Guidelines: Module 5 – Obstetrics              |
COAGULATION ASSESSMENT

Traditionally, perioperative coagulation monitoring has relied on clinical judgement and standard laboratory tests (SLTs). However, many SLTs were designed to test for coagulation factor deficiencies, not for predicting risk of bleeding or guiding haemostatic management. Moreover, utility of SLTs in emergency situations is limited by slow turnaround times due to sample transport and plasma preparation requirements.³

Routine coagulation testing to predict perioperative bleeding risk in unselected patients prior to surgery or other invasive procedures is not recommended.²,³ Coagulation tests may suggest increased bleeding risk, but they cannot predict intraoperative or postoperative bleeding caused by exogenous factors.³

Selective laboratory testing is advised because it is more cost-effective and more evidence based. Preoperative assessment of aPTT, PT, INR, fibrinogen and platelet count is warranted in patients with bleeding disorders, a history of bleeding or a clear clinical indication (e.g. HELLP syndrome [haemolysis, elevated liver enzymes and low platelets], liver disease or leukaemia).

Platelet function screening, eg with a Platelet Function Analyser (PFA-100®, Siemens, Tarrytown, NY) may be useful preoperatively in patients with a positive bleeding history or taking antiplatelet medication.³

POINT-OF-CARE COAGULATION ASSESSMENT

Point-of-care (POC) coagulation assays such as thrombelastography (TEG; Haemoscope Inc., Niles, IL) and thromboelastometry (ROTEM; TemInternationalGmbH, Munich, Germany), enable rapid intraoperative diagnosis of the cause of bleeding³ but are not practical to use in preoperative bleeding risk assessment and may not predict bleeding risk.

Indiscriminate preoperative coagulation monitoring using POC assays is unlikely to be cost-effective, but it may be warranted in combination with standard laboratory testing in patients with bleeding disorders such as VWD, factor XII deficiency, and haemophilia A with dysfibrinogenaemia.³ Consideration for use in cardiac surgery is recommended.⁴

Similarly, there is currently little evidence to support additional, routine application of point-of-care INR testing in the preoperative setting to predict bleeding tendency, despite the fact that many recent devices provide results which are comparable with laboratory testing.³
REFERENCES:


APPENDIX 1:
PREOPERATIVE BLEEDING RISK ASSESSMENT AND INTERVENTION – CONSIDERATIONS FOR ORGANISATIONS WANTING TO IMPROVE CLINICAL PRACTICE

Assessment and management of bleeding risk is a key component of PBM strategies to minimise blood loss. In order to incorporate preoperative bleeding risk assessment and intervention into routine practice, the use of clinical practice improvement methodology is recommended. Identifying a lead clinician or clinicians (e.g., anaesthetist, haematologist, high risk preoperative physician/anaesthetist or general physician with an interest in the area or role in the management of surgical patients) is an important starting point.

Clinical practice improvement (CPI) is the overarching name for a series of methodologies that can be taken to plan, implement, and assess the impact of changes in the delivery of health services. Clinical practice improvement is not a one-off event but a continuing cycle of improvement activities. CPI methodology is described in detail in the Easy Guide to Clinical Practice Improvement, and many organisations offer training courses that are based around the participant undertaking a project.

Key steps of the CPI process are outlined below with specific examples given for a project centred on incorporating preoperative bleeding risk assessment and intervention into routine preoperative care in cardiac surgery patients.

- Form a guidance team: Gain support from relevant hospital heads including cardiothoracic surgery, anaesthetics, haematology, nursing and safety and quality.

- Collect baseline data: Undertake an audit of the frequency and current management of preoperative bleeding risk assessment in cardiac surgery patients.

- Establish a multidisciplinary project team consisting of the team leader and people with fundamental knowledge of the process; for example, this could include: cardiac surgery clinical nurse consultant, cardiac surgery nurse coordinator, cardiac surgeon, cardiac surgery registrar, cardiac surgery resident medical officer, cardiac surgery physiotherapist, high-risk peri-operative physician, anaesthetist overseeing pre-admission clinic, general practitioner (GP), GP liaison nurse, haematologist, transfusion nurse consultant and a consumer. Include a quality improvement facilitator.

- Develop an aim or mission statement that is SMART, i.e., Specific, Timely, Measurable, Appropriate, Result oriented and Time scheduled. (e.g., To increase the percentage of patients on the cardiac surgery waiting list with bleeding risk assessed and managed prior to surgery by 75% by MM/YY)

- Diagnostic phase: Map (flow-chart) current hospital processes for cardiac surgery patients preoperatively (starting with initial referral), conduct a brainstorming session of the barriers and enablers to improvement with the project team, construct a cause and effect diagram and prioritise the causes in a Pareto chart.
干预阶段：达成团队在何处集中改进精力的共识。使用计划-做-研究-行动（PDSA）框架进行改进周期。由当地专家定制的建议流程图可能需要进行定制，以适应患者群体和医院资源/转诊路径。团队也需要决定最适合其本地环境的出血评估工具。

影响和实施阶段：测量改进变化的影响，以确保干预取得了改善，并提供将这些变化永久实施所需证据的必要信息。测量在每一轮改进周期内早期手术患者中出血风险评估和管理的患者数量。

维持改善阶段：建立标准、现有系统和流程标准、相关政策、程序、指南的文档、员工培训和教育的机制，以及持续的测量和回顾，以保持改进的实现。
APPENDIX 2:
CLASSIFICATION OF EVIDENCE LEVELS AND GRADES OF RECOMMENDATIONS

a) Classification of evidence levels and grades of recommendations – British Committee for Standards in Haematology Guidelines on the assessment of bleeding risk prior to surgery or invasive procedures

Classification of evidence levels
Ia Evidence obtained from meta-analysis of randomised controlled trials.
Ib Evidence obtained from at least one randomised controlled trial.
IIb Evidence obtained from at least one well-designed controlled study without randomisation.
IIb Evidence obtained from at least one other type of well-designed quasi-experimental study*.
III Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.
IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

*refers to a situation in which implementation of an intervention is out with the control of the investigators, but an opportunity exists to evaluate its effect.

Classification of grades of recommendations
A Requires at least one randomised controlled trial as part of a body of literature of overall good quality and consistency addressing specific recommendation. (Evidence levels Ia, Ib).
B Requires the availability of well conducted clinical studies but no randomised clinical trials on the topic of recommendation. (Evidence levels IIa, IIb, III).
C Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates an absence of directly applicable clinical studies of good quality. (Evidence level IV).

b) Grades of recommendation – GRADE system – Management of severe perioperative bleeding: guidelines from the European Society of Anaesthesiology

<table>
<thead>
<tr>
<th>Clarity of benefit</th>
<th>Quality of supporting evidence</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1A Strong</strong> recommendation. High quality evidence</td>
<td>Benefits clearly outweigh risk and burdens, or vice versa.</td>
<td>Consistent evidence from well performed randomised, controlled trials or overwhelming evidence of some other form. Further research is unlikely to change our confidence in the estimate of benefit and risk.</td>
</tr>
<tr>
<td><strong>1B Strong</strong> recommendation. Moderate quality evidence</td>
<td>Benefits clearly outweigh risk and burdens, or vice versa.</td>
<td>Evidence from randomised, controlled trials with important limitations (inconsistent results, methodological flaws, indirect or imprecise), or very strong evidence of some other form. Further research (if performed) is likely to have an impact on our confidence in the estimate of benefit and risk and may change the estimate.</td>
</tr>
</tbody>
</table>
### c) Recommendations and Practice points – Patient Blood Management Guidelines

The Patient Blood Management Guidelines contain both recommendations and practice points to guide clinical practice. Recommendations are based on evidence from systematic review of the literature using the National Health and Medical Research Council (NHMRC) grades of recommendations definitions; and the practice points are based on consensus decision-making, where insufficient high-quality data was available.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Body of evidence can be trusted to guide practice</td>
</tr>
<tr>
<td>B</td>
<td>Body of evidence can be trusted to guide practice in most situations</td>
</tr>
<tr>
<td>C</td>
<td>Body of evidence provides some support for recommendation[s] but care should be taken in its application</td>
</tr>
<tr>
<td>D</td>
<td>Body of evidence is weak and recommendations must be applied with caution</td>
</tr>
</tbody>
</table>
APPENDIX 3:
EUROPEAN SOCIETY OF ANAESTHESIOLOGY (ESA) GUIDANCE REGARDING CESSATION OF MEDICATIONS (EXTRACT)²

Note: Whilst the ESA guidelines provide guidance regarding aspirin, warfarin, and NOAC, it is recommended that Australasian guidelines and references be consulted in the first instance.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Recommendation/suggestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual antiplatelet therapy</td>
<td>We recommend discontinuing dual antiplatelet therapy before urgent intracranial neurosurgery. A risk-benefit analysis is required for the continuation of aspirin monotherapy during neurosurgery. 1B</td>
</tr>
<tr>
<td></td>
<td>We suggest that urgent or semi-urgent surgery should be performed under aspirin/clopidogrel or aspirin/prasugrel combination therapy if possible, or at least under aspirin alone. 2C</td>
</tr>
<tr>
<td>Metal or drug-eluting stent</td>
<td>We recommend against performing orthopaedic surgery during the first three months after bare metal stent implantation or during the first twelve months after drug-eluting stent implantation. 1C</td>
</tr>
<tr>
<td></td>
<td>We recommend postponement of elective surgery following coronary stenting (at least 6 to 12 weeks for bare metal stent and one year for drug-eluting stents). 1C</td>
</tr>
<tr>
<td>Selective serotonin reuptake inhibitor (SSRI)</td>
<td>We suggest that selective serotonin reuptake inhibitor (SSRI) treatment should not be routinely discontinued perioperatively. 2B</td>
</tr>
<tr>
<td>Antiepileptic agents</td>
<td>We suggest individualised perioperative discontinuation of antiepileptic agents, such as valproic acid, which may increase bleeding. 2C</td>
</tr>
<tr>
<td>Complementary medicines</td>
<td>We do not recommend discontinuation of Gingko biloba extracts. 1B</td>
</tr>
</tbody>
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