1. **PRACTICE OUTCOME**

1.1. This document provides evidence informed clinical practice guidelines for practitioners ordering preoperative laboratory tests for adult patients undergoing elective surgery.

1.2. Pre-operative testing will be based on the proposed surgical procedure, the patient’s age, and an assessment of the patient’s health status. (see Appendix A).

1.3. Use of these standards will enhance patient care by eliminating unnecessary tests and avoiding duplicate tests, and will support the efficient use of existing resources.

2. **BACKGROUND**

- A guideline (and grid) was developed in 2010 as one phase of a provincial initiative to improve the quality and coordination of preoperative care.

- At that time, there were no regional or widely accepted national standards to guide physicians into ordering required preoperative tests.

- For the initial guideline, physicians from Surgery, Anesthesia, and providers from Family Medicine- Primary Care supported the need to develop these standards collaboratively, and formed a clinical group. The group reviewed available clinical evidence and guidelines. For specific tests, consultations with neurology, hematology and blood conservation were obtained.

- In the absence of a widely accepted national standard, consensus on indications for each preoperative lab test were then obtained and developed into a grid which was widely vetted and accepted as an EIPT.

- Since 2010 there have been three important developments on this topic.
  1. Serial audits of the guideline’s effectiveness in reducing the ordering of unnecessary tests showed only a transient reduction at 6 months post implementation, with a return to pre-guideline implementation levels at 2 years post implementation.
  2. A new project supported by the Manitoba Patient Access Network was convened to identify reasons for poor uptake, and to design knowledge translation tools to improve use of the guideline. This project identified that some users found the 2010 guideline too difficult to interpret and follow within the time constraints of a busy clinical practice.
  3. In September 2015, the Canadian Anesthesiologists’ Society, through Choosing Wisely Canada (CWC), made 5 recommendations that vastly simplify preoperative testing for patients undergoing minor surgery (http://www.choosingwiselycanada.org/recommendations/anesthesiology/), which were discordant with the WRHA 2010 guidelines and grid. As CWC is a nationally recognized and respected organization, an opportunity was identified to improve and revise the WRHA guidelines and replace the grid with a simpler algorithm.

3. **DEFINITIONS**

**Minor surgery**: Corresponds to Category 1 and 2 on the Johns Hopkins Surgical Classification System (see Appendix B), low risk surgery in the American College of Cardiology Guidelines (Fleisher et al.), and Grade 1 and 2 surgery in the NICE guidelines (National Institute for Clinical Excellence). It is associated with an expected blood loss of...
CLINICAL PRACTICE GUIDELINE

Practice Guideline: Routine Preoperative Tests for Adult Patients Undergoing Elective Surgery

Approved By: WRHA Professional Advisory Council

Approval Date: July 6, 2016

Guideline Number: WRHA Professional Advisory Council

Pages: 2 of 7

Supercedes: November 2010

<500mL, minimal fluid shifts and includes ambulatory surgery, breast lumpectomy, cataract surgery and endoscopic surgery, among other types of surgery. A list of common minor surgeries is provided for guideline users on p.2 of the algorithm.

**Major surgery:** Corresponds to Categories 3, 4 and 5 on the Johns Hopkins Surgical Classification System (see Appendix B), intermediate and high risk surgery in the American College of Cardiology Guidelines (Fleisher et al.), and Grade 3 and 4 surgery in the NICE guidelines (National Institute for Clinical Excellence). It includes open and laparoscopic surgery on major abdominal organs, operations on the brain or in the chest, most vascular and spine surgery and typically involves at least one night in hospital. A list of common major surgeries is provided for guideline users on p.2 of the algorithm.

4. **GUIDELINES**

4.1 The 2015 guideline and algorithm provides clear direction for preoperative testing based first, on the type of surgery (minor versus major surgery) and second, on patient factors (age, medical comorbidities, drug therapies, etc). Indications for each preoperative lab test are identified in the attached algorithm.

4.2 For patients with stable chronic disease, even if no preoperative tests are indicated by the algorithm, caregivers are still expected to review available paper and electronic records to establish baseline laboratory values. For example, a baseline creatinine and electrolytes in a patient with stable chronic renal insufficiency, or a baseline ECG for a patient with stable ischemic heart disease.

4.3 Tests are valid for 6 months provided there has been no interim change in the patient's condition.

4.4 For patients with complex or uncommon surgical or medical conditions, tests beyond what is suggested in the algorithm may be appropriate.

4.5 The guideline and algorithm do **not** apply to the following:
- pediatric patients (< 16 years old)
- patients undergoing cardiac surgery at St. Boniface Hospital
- patients undergoing cesarean section

5. **RESOURCES**

A two page algorithm is attached to practice guideline (see Appendix A). The guideline and algorithm will reside online.

A Preoperative Testing App is also available at [www.logixmd.com/preop](http://www.logixmd.com/preop) or by scanning the QR code below.
6. **SOURCE/REFERENCES**


Institute of Health Economics (2007) Routine Preoperative Tests: are they necessary?


7. **PRIMARY AUTHOR**

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*Development group for 2015 guideline and algorithm*

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*Clinical Group for 2010 guideline development:*

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Stephen Kowalski: Head of Health Sciences Centre Department of Anesthesia
Trevor Lee: Head of St. Boniface Department of Anesthesia
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Consultants for 2010 guideline:
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Brian Muirhead and Susan Kenny: WRHA Blood Conservation
Yahya Aghakhani: Neurologist, special interest in epilepsy
Subash Sethi: Co-site Medical Manager, Misericordia Health Centre and Victoria General Hospital

8. **ALTERNATE CONTACT**
Eric Bohm: Chair WRHA Orthopaedics Standards & Quality committee, Lead for Health System Performance, Centre for Healthcare Innovation

9. **APPENDICIES**

   **Appendix A:** Routine Preoperative Lab Test Guideline Algorithm
   **Appendix B:** The Johns Hopkins Surgical Classification System
Appendix A: Routine Preoperative Lab Test Guideline Algorithm

**Routine Preoperative Lab Test Guidelines**

**For adult patients (> 16 years) undergoing elective surgery**

**MINOR SURGERY**

Associated with an expected blood loss of <500mL, minimal fluid shifts and is typically done on an ambulatory basis (day surgery) or same day discharge*. It includes minor surgery, trauma surgery without resection, laparoscopic cholecystectomy, and tubing ligature; and most ophthalmic, superficial, endoscopic, and gynecologic and urologic procedures.

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**MAJOR SURGERY**

Associated with an expected blood loss of >500mL, significant fluid shifts and typically at least one night in hospital†. Includes laparoscopic surgery (except cholecystectomy and tubal ligation); open resection of organic large joint replacements, mastectomy with reconstruction; and spine, thoracic, vascular, or intracranial surgery.

¢ If the surgeon is essentially ambulatory but the patient has a medical reason for overnight admission (e.g., ASA > 2), perform all preoperative tests for adult patients undergoing major surgery or anatraumatic surgery.

### Do Not Order Preoperative Tests

- **Chest X-rays:** Not recommended for any surgery except to facilitate the diagnosis of new or worsened symptoms, or to order the surgery prior to thoracic surgery or to work up a malignancy.

### Specific Directions for Other Tests & Conditions

- **Pulmonary function tests, spirometry, or arterial blood gases:** Not recommended except prior to thoracic surgery, as ordered by the surgeon.
- **Preoperative testing:** Will be carried out by preoperative staff as required.
- **Perioperative type and screen:** Will be ordered by surgeon, anesthesiologist, or preanesthesia clinic when indicated, in the preanesthesia clinic.
- **Renal function tests:** Should be obtained for patients on Carbenicillin, Phleomycin, Phenytoin, or Hycotin "zoloft" who meet all the following criteria: history of unstable liver function test results, a recent AGI level of >2 in the last 6 months, or undergoing major gastrointestinal surgery.

### Major Surgery, All Ages: Other tests indicated by patient characteristic & co-morbidities

- **Oral Carboxyhemoglobin, DM or HbA1C > 40:** Add hemoglobin A1C or fasting plasma glucose.
- **Malignancy:** BMI > 40, or linear disease: Add liver function tests and I&I.
- **At high risk for iron deficiency:** Add serum iron, TIBC, and Ferritin.
- **Thyroid disease:** Add TSH.

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**LEGEND: TESTS**

- **CBC:** Complete Blood Count.
- **Cr/EK:** Creatine and Erythrocyte, estimated Glomerular Filtration Rate
- **EKG:** Electrocardiogram.
- **Liver function tests:** ALT, AST, ALB, TBIL, GGTP, albumin total and direct bilirubin.
- **Hb, Ht, CK, TCO2:** Hemoglobin, hematocrit, creatinine, total carbon dioxide.

**LEGEND: PATIENT CHARACTERISTICS**

- **ACE:** Angiotensin-Converting Enzyme Inhibitor medication.
- **ARB:** Angiotensin Receptor Blocker medication.
- **DM:** Diabetes Mellitus.
- **I&I:** Hypertension.
- **Cerebrovascular disease:** Previous or current history of cerebrovascular disease, or transient ischemic attacks.
- **Renal disease:** History of proteinuria or obstructive uropathy/renal failure.
- **Liver disease:** Includes: jaundice, hepatitis, cirrhosis, hepato-cellular, and intrahepatic (defined as elevation in AST > 2 standard deviations) or extrahepatic (defined as elevation in ALT > 2 standard deviations).
- **Multi-Risk:** Includes patients with BMI < 15% or 10% body weight loss over previous 6 months. Inflammatory bowel disease, vasculitis, rectal or perianal surgery.
- **High risk of iron deficiency:** Includes patients with low Hb/Hct or high ferritin on CBC.

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For more examples of minor & major surgery, please see the reverse side.

To access the electronic version of this document, please visit: wrha.mb.ca/externals.portal/851003.php

For an interactive preop test decision aid, visit: logium.com/preop or use the QR code above.

Revised: 2016.07.06
**Appendix A: (continued)**

### MAJOR & MINOR SURGERY: COMMON EXAMPLES

The common minor and major surgeries listed in this table generally adhere to the definitions given. However, clinical judgment should be applied. If higher than expected blood loss, fluid shifts and invasiveness are likely due to surgical pathology, then it would be appropriate to consider a minor surgery as a major surgery and order preoperative tests accordingly (i.e. very large basal cell carcinoma, extensive biopsy of lesions for endometriosis).

#### MINOR and Oral Surgery
- Tooth extraction
- Tonsillectomy and/or adenoidectomy
- Septoplasty, turbinectomy and/or rhinoplasty
- Pharyngolaryngopharyngolaryngeal biopsy or minor excision by laser or other means
- Middle ear surgery
- Mastoidectomy, cholesteatoma implantation
- Endoscopic sinus surgery
- Small resections of benign and malignant masses, done on an ambulatory basis (i.e. mandibular torus, nasal polyps, cyst, small tongue cancer)
- Thyroidectomy

#### General Surgery
- Breast lpectomy or mastectomy with or without lymph node biopsy or axillary dissection
- Regional/extended hernia repair by laparoscopic or open approach
- Laparoscopic cholecystectomy
- Herniorrhaphy

#### Orthopedic Surgery
- Arthroscopic surgery including ACL, repair
- Routine hardware removal, not for infection
- Tenodesis
- Arthroscopy
- Osteotomy
- Arthroplasty
- Spinal laminectomy and/or fusion

#### Plastic Surgery
- Cephalic tunnel release
- Diagnosic nerve contracture release
- Major and minor tendon surgery
- Small rotational flaps and skin grafts
- Basal cell carcinoma excision
- Lipoma excision
- Reduction mammaplasty and other surgery for benign breast disease
- Cosmetic breast surgery

#### Thoracic Surgery
- Bronchoscopy
- Resection of lung, esophagus or mediastinal mass (thoracoscopic or open)
- Hiatal hernia repair (thoracoscopic or open)

#### Urology
- Uroscopy, Ureteroscopy, Renoscopy for stones, structure, or biopsy
- Prostate biopsy
- Vesicectomy
- Circumcision
- Resection of bladder or prostatic tumor (transurethral or open)
- Resection of kidney or ureter (laparoscopic or open)
- Resection of testis (transscrotal or abdominal)

#### Vascular Surgery
- Varicose vein excision
- Femoral artery endarterectomy
- Peripheral arterial bypass surgery
- Aortic aneurysm repair (endovascular or open)
- Carotid endarterectomy

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### Appendix B: THE JOHNS HOPKINS SURGICAL CLASSIFICATION SYSTEM

#### Category 1
- Minimal risk to the patient independent of ana
- Minimally invasive procedures with little or no blood loss
- Often done in an office setting with the operating room used principally for anaesthesia and monitoring

**Includes:**
- Breast biopsy
- Removal of minor skin or subcutaneous lesions
- Myringotomy/tubing
- Hysteroscopy
- Cystoscopy
- Vasectomy
- Circumcision
- Fiberoptic bronchoscopy

**Excludes:**
- Open exposure of internal body organs
- Repair of vascular or neurologic structures
- Placement of prosthetic devices
- Entry into abdomen, thorax, neck, cranium or extremities
- Postoperative monitored care setting (ICU, ACU)

#### Category 2
- Minimal to moderately invasive procedure
- Blood loss less than 500 cc
- Mid risk to patient independent of anaesthesia

**Includes:**
- Diagnostic laparoscopy
- Dilatation and curetage
- Fallopian tubal ligation
- Arthroscopy
- Inguinal hernia repair
- Laparoscopic lysis of adhesions
- Tonsillectomy/lateral pharyngectomy
- Umbilical hernia repair
- Septoplasty/rhinoplasty
- Peritonsillar abscess
- Laparoscopic cholecystectomy
- Extensive superficial procedures

**Excludes:**
- Open exposure of internal body organs
- Repair of vascular or neurologic structures
- Placement of prosthetic devices
- Postoperative monitored care
- Open exposure of abdomen, thorax, neck, cranium
- Resection of major body organs

#### Category 3
- Moderately to significantly invasive procedure
- Blood loss potential 500–1500 cc
- Moderate risk to patient independent of anaesthesia

**Includes:**
- Thyroidectomy
- Hysterectomy
- Myomectomy
- Cystectomy
- Cholecystectomy
- Laminectomy
- Hip/nee replacement
- Nephrectomy
- Major laparoscopic procedures
- Resection/reconstructive surgery of the digestive tract

**Excludes:**
- Open thoracic or intracranial procedure
- Major vascular repair (e.g. aortofemoral bypass)
- Planned postoperative monitored care setting (ICU, ACU)

#### Category 4
- Highly invasive procedure
- Blood loss greater than 1500 cc
- Major risk to patient independent of anaesthesia

**Includes:**
- Major orthopaedic/spinal reconstruction
- Major resection of the gastrointestinal tract
- Major genito-urinary surgery (e.g. radical retroperitoneal prostatectomy)
- Major vascular repair without postoperative ICU stay

#### Category 5
- Highly invasive procedure
- Blood loss greater than 1500 cc
- Critical risk to patient independent of anaesthesia
- Usual postoperative ICU stay with invasive monitoring

**Includes:**
- Cardiac/thoracic procedure
- Intracranial procedure
- Major procedure on the oropharynx
- Major vascular, skeletal, neurologic repair