

## Pre-Operative Testing

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| Policy Number: AHS – G2023 – Pre-Operative Testing | Prior Policy Name and Number, as applicable: |
| Effective Date: 01/01/2022 – 4/30/2022             |  |

### I. Policy Description

Pre-operative testing refers to the evaluation of the healthy patient to detect unrecognized disease and risk factors that may increase the risk of surgery above baseline and to propose strategies to reduce this risk. Specific laboratory studies commonly ordered for preoperative evaluation include a complete blood count, electrolytes, renal function, blood glucose, liver function studies, hemostasis evaluation, and urinalysis (Smetana, 2020).

### II. Related Policies

| Policy Number | Policy Title   |
|---------------|----------------|
|               | Not Applicable |

### III. Indications and/or Limitations of Coverage

*Application of coverage criteria is dependent upon an individual's benefit coverage at the time of the request. Medical Policy Statements do not ensure an authorization or payment of services. Please refer to the plan contract (often referred to as the Evidence of Coverage) for the service(s) referenced in the Medical Policy Statement. If there is a conflict between the Medical Policy Statement and the plan contract (i.e., Evidence of Coverage), then the plan contract (i.e., Evidence of Coverage) will be the controlling document used to make the determination.*

*Application of coverage criteria is dependent upon an individual's benefit coverage at the time of the request. If there is a conflict between this Policy and any relevant, applicable government policy [e.g. National Coverage Determinations (NCDs) for Medicare] for a particular member, then the government policy will be used to make the determination. For the most up-to-date Medicare policies and coverage, please visit their search website <http://www.cms.gov/medicare-coverage-database/overview-and-quick-search.aspx?from2=search1.asp&> or [the manual website.](#)*

1. The following pre-operative tests **MEETS COVERAGE CRITERIA** for the indications as noted.



| TEST                   | INDICATION   |
|------------------------|--|
| <b>PT/INR and PTT</b>  | <ul style="list-style-type: none"> <li>○ Clinical evidence or history of bleeding disorder (easy bruising, nose bleeds, bleeding gums from dental procedures), or</li> <li>○ Family history of bleeding disorder, or</li> <li>○ History or presence of liver disease, or</li> <li>○ Anticoagulant use or drugs affecting coagulation, or</li> <li>○ Craniotomy or spine surgery</li> </ul>                         |
| <b>PLATELET COUNT:</b> | <ul style="list-style-type: none"> <li>○ Known platelet abnormality or abnormal bleeding history, or</li> <li>○ History of hematological malignancy, or</li> <li>○ Thrombosis, purpura, petechiae or clinical bleeding, or</li> <li>○ History of radiation or chemotherapy, or</li> <li>○ Systemic diseases that may affect platelet count (i.e. Lupus, liver disease, etc.), or</li> <li>○ HIV or AIDS</li> </ul> |

| TEST                             | INDICATION   |
|----------------------------------|--|
| <b>HEMOGLOBIN AND HEMATOCRIT</b> | <ul style="list-style-type: none"> <li>○ Any procedure in which significant blood loss (greater than 500ml) is anticipated, or</li> <li>○ If the patient has donated blood within the last 2 months, or</li> <li>○ Patient history suggestive of anemia, leukemia or cancer, or</li> <li>○ Abnormal bleeding history, or</li> <li>○ History of renal or liver disease, or</li> <li>○ Anticoagulant use, or</li> <li>○ Bariatric surgery</li> </ul> |

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|--|--|
| <b>SERUM CHEMISTRY-<br/>Basic Metabolic Panel<br/>(BMP):</b> | <ul style="list-style-type: none"> <li>○ History of diabetes, or</li> <li>○ History of hypertension or CAD, or</li> <li>○ History of renal disease or renal toxic medications, or</li> <li>○ Medications that may cause electrolyte or other BMP abnormalities (i.e. diuretics, NSAID, steroids, Digoxin, etc.), or</li> <li>○ History of liver disease, or</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>○ Central nervous system disease, or</li> <li>○ Morbid obesity, or</li> <li>○ Any systemic disease that may significantly affect electrolytes or other BMP components (i.e. adrenal disease, AIDS, etc.)</li> </ul>   |
| <b>LIVER FUNCTION TESTS:</b>                                 | <ul style="list-style-type: none"> <li>○ Any patient with known or suspected liver disease, or</li> <li>○ Patients with bleeding abnormalities</li> </ul>  |
| <b>TSH</b>   | <ul style="list-style-type: none"> <li>○ History of hyperthyroidism or hypothyroidism, or</li> <li>○ Patients taking medications that can alter thyroid function (i.e. Amiodarone, Lithium), or</li> <li>○ History of palpitations, sweating, or weight loss of unknown etiology, or</li> <li>○ History of lethargy, cold intolerance, weight gain, constipation or hair loss of unknown etiology</li> </ul>   |
| <b>URINALYSIS</b>  | <ul style="list-style-type: none"> <li>○ Patients with or getting prosthetic implants, or</li> <li>○ Patients undergoing prostatectomy, or</li> <li>○ Patients who are symptomatic for a urinary tract infection, or</li> <li>○ Patients with a specific indication for urinalysis (i.e. a kidney stone or planned genitourinary procedure), or</li> <li>○ A reflex urinalysis (culture will only be done if UA is abnormal) should be requested rather than a UA and C/S unless a symptomatic UTI is suspected</li> </ul> |
| <b>URINE CULTURE</b>   | <ul style="list-style-type: none"> <li>○ Patients with renal stones in the genitourinary tract, or</li> <li>○ Patients who will have urethral manipulation as part of the surgical procedure, or</li> <li>○ Patients with suspected urinary tract infections</li> </ul>  |
| <b>PREGNANCY TEST</b>  | <ul style="list-style-type: none"> <li>○ Any female of childbearing potential, regardless of birth control method, or</li> </ul>   |

|                                      |  |
|--------------------------------------|--|
|                                      | <ul style="list-style-type: none"> <li>○ Any patient undergoing a hysterectomy or gynecological procedure with childbearing potential or unclear childbearing status, or</li> <li>○ Pregnancy tests DO NOT need to be performed on women who cannot conceive</li> </ul>  |
| <b>TEST</b>                          | <b>INDICATION</b>  |
| <b>TYPE AND SCREEN OR CROSSMATCH</b> | <ul style="list-style-type: none"> <li>○ A blood screen (T&amp;S) should be done for any patient that has a reasonable probability for requiring blood intra-operatively, or</li> <li>○ A blood type and crossmatch (T&amp;C) should be done for any patient that is expected to require an intra-operative transfusion</li> </ul> |
|                                      |  |

#### IV. Scientific Background

In general, the overall risk of surgery is extremely low and the prevalence of unrecognized disease that influences surgical risk is low in healthy individuals. Clinicians often perform laboratory tests out of habit and medicolegal concern (Kachalia et al., 2015; Sigmund, Stevens, Blitz, & Ladapo, 2015). Complete blood counts (CBC), renal function tests, electrolyte tests, blood glucose, liver function tests, hemostasis tests, urinalysis, and pregnancy testing are some of the most commonly performed pre-operative tests. Although routine assessment of these clinical features is not typically necessary, specific indications or situations may warrant a pre-operative test. For example, although electrolyte assessment is not usually recommended, a patient may have a medical history suggesting an electrolyte abnormality. In this case, an electrolyte assessment would be indicated. Consensus varies from test to test, and many pre-operative tests do not have a clear consensus (Smetana, 2020).

##### *Complete Blood Count (CBC)/Hemoglobin*

A baseline hemoglobin measurement is suggested for older patients (typically 65 or older) who are undergoing major surgery, if a patient is undergoing major surgery that is expected to result in significant blood loss, or if the history suggests anemia. The frequency of significant unsuspected white blood cell or platelet abnormalities is low (Kaplan et al., 1985) and there is little rationale to support baseline testing of either. Nevertheless, obtaining a complete blood count, including white blood cell count and platelet measurement, can be recommended if the cost is not substantially greater than the cost of a hemoglobin concentration alone (Smetana, 2020).

##### *Creatinine*

A serum creatinine concentration is appropriate in patients over the age of 50 undergoing intermediate- or high-risk surgery although there is no clear consensus on this point (Kaplan et al., 1985; Turnbull & Buck, 1987). It should also be ordered when hypotension is likely or when nephrotoxic medications will be used (Velanovich, 1991). Renal insufficiency is an independent risk factor for postoperative pulmonary complications (Smetana, Lawrence, & Cornell, 2006) and a major predictor

of postoperative mortality (Mathew et al., 2008). Renal insufficiency necessitates dosage adjustment of certain medications that may be used perioperatively (Smetana, 2020).

### *Miscellaneous*

Pregnancy testing is appropriate for women of childbearing age. Routine electrolyte determinations, blood glucose measurements, liver enzyme testing, urinalysis and hemostasis testing are not recommended unless the patient has a history that increases the likelihood of an abnormality (Smetana, 2020).

There is a high incidence of false-positive results for pre-operative testing. Normal test values are defined as those occurring within two standard deviations from the mean. 5% of healthy individuals who have a single screening test will have an abnormal result. A screening panel containing 20 independent tests in a patient with no disease will yield at least one abnormal result 64% of the time. Thus, the predictive value of abnormal test results is low in healthy patients with a low prevalence of disease. Clinical evaluation, encompassing evaluation of factors, such as age and medication use, may identify patients at risk just as well as pre-operative testing (Smetana, 2020).

A practice advisory from the American Society of Anesthesiologists (ASA) recommends against routine preoperative laboratory testing in the absence of clinical indications (Apfelbaum et al., 2012). Overall, selective testing is appropriate in patients with known underlying diseases or risk factors that would affect operative management or increase risk, as well as for specific high-risk surgical procedures (Smetana, 2020).

### *Clinical Validity and Utility*

In a trial of 1161 ambulatory surgical patients randomly assigned to preoperative testing (complete blood count, electrolytes, blood glucose, creatinine, electrocardiogram (ECG), and/or chest radiograph) or no testing, there was no difference in perioperative adverse events or events within 30 days of ambulatory surgery (Chung, Yuan, Yin, Vairavanathan, & Wong, 2009).

Fritsch et al. evaluated the correlation of abnormal pre-operative tests to pathological findings in the medical history. 1363 female patients were included, 86 of which had a perioperative complication. The percentage of abnormalities ranged from 1.6% (electrolytes) to 29.7% (echocardiography). The authors performed a binary regression analysis and found that “age, type of surgery and medical history are appropriate predictors of perioperative complications whereas abnormalities in laboratory tests seem to have restricted ability in predicting adverse perioperative outcome” (Fritsch et al., 2012).

A retrospective review of 73596 patients using the National Surgical Quality Improvement Program (NSQIP) database found that preoperative tests were performed in 63.8% (46977) of patients; 61.6% of these patients had at least one abnormal test result. However, after adjustment for patient and procedure characteristics, neither preoperative testing nor the finding of an abnormal test result was associated with adverse postoperative outcomes. The authors concluded that “preoperative testing is overused in patients undergoing low-risk, ambulatory surgery (Benarroch-Gampel et al., 2012).”

Nieto et al. (2017) evaluated routine preoperative laboratory testing in elective pediatric cardiothoracic surgery in 1106 cases. The authors identified 6 cancellations due to abnormal test results, and the hospital charge for testing averaged \$2064 per patient. The authors calculated that 184 routine tests were required to identify one abnormal test. The authors concluded that “testing

does not significantly impact decision-making in elective pediatric cardiothoracic surgery. Selective preoperative laboratory testing may have a positive impact on healthcare costs without affecting outcomes (Nieto et al., 2017).”

Husk et al. (2018) compared the prevalence of abnormal preoperative laboratory results with age in a retrospective cohort study of women undergoing urogynecologic surgery. Older (age,  $\geq 65$  years) women were compared with younger (age, 50-64 years) women. The authors found that overall, 18.3% of participants had at least one abnormal result, with older women more likely to have an abnormal result (28.7% vs 10.7%). Older women had higher rates of abnormal hemoglobin (13.8% vs 6.0%) and creatinine values (10.8% vs 2.7%), with no significant differences for platelets, sodium, or potassium. After adjusting for potential confounders, older age remained associated with an abnormal preoperative result (odds ratio, 3.6). The authors concluded that “women 65 years or older had a greater than 25% chance of having an abnormal preoperative laboratory result and were at higher risk compared with younger women. Age 65 years or greater should be considered as a criterion for preoperative laboratory testing in urogynecologic patients (Husk et al., 2018).”

Lakomkin et al. (2018) explored the relationship between commonly obtained preoperative laboratory results and postoperative complications following one- to two-level posterolateral lumbar fusions (PLFs). They found that after controlling for age, ASA score, length of surgery, and all significant comorbidities, abnormal sodium (odds ratio [OR]=2.47) and abnormal INR (OR=2.33) were significantly associated with the development of any complication. Sodium (OR=1.61) and platelets (OR=1.58) were associated with minor complications. Meanwhile, creatinine (OR=1.74) and platelets (OR=1.71) were significant predictors of major adverse events. The authors concluded that “although the majority of laboratories were not significantly associated with adverse events, abnormal sodium values, INR, creatinine, and platelets were shown to be predictive of various complications (Lakomkin et al., 2018).”

Ruetzler et al. (2018) investigated whether longer periods between preoperative laboratory testing and surgery are associated with increased odds morbidity and mortality. The study included 235010 “relatively healthy” patients from the American College of Surgeons National Surgical Quality Improvement Program with normal blood test results who were treated between 2005 and 2012. A total 4082 patients (1.74%) had a component morbidity or died within 30 days after surgery. The authors found that the unadjusted incidence was “1.7% when the most recent laboratory blood tests measured within 1 week of surgery, 1.7% when it was within 1-2 weeks, 1.8% when it was within 2-4 weeks, 1.7% when it was between 1 and 2 months, and 2.0% for patients with most recent laboratory blood tests measured 2-3 months before surgery.” None of the values within 2 months differed significantly: estimated odds ratios for patients within blood tested within 1 week were 1.00 as compared to 1-2 weeks, 0.88 for 2-4 weeks, and 0.95 for 1-2 months, respectively. The estimated odds ratio comparing 1-2 weeks to each of 2-4 weeks and 1-2 months were 0.88 and 0.95 respectively. Blood testing 2-3 months before surgery was associated with increased odds of outcome compared to patients whose most recent test was within 1 week and 1-2 weeks of the date of surgery. They concluded that “in American Society of Anesthesiologists (ASA) physical status I and II patients, risk of 30-day morbidity and mortality was not different with blood testing up to 2 months before surgery, suggesting that it is unnecessary to retest patients shortly before surgery (Ruetzler et al., 2018).”

Riggs et al. (2018) conducted an assessment of the independent association of patient- and surgery-specific risk with receipt of outpatient preoperative testing on a retrospective cohort of 678,368 privately-insured, non-elderly US adults who underwent one of ten operations, including one

lower-risk and one higher-risk operation from five surgical specialties. Outcomes were “receipt” of nine outpatient tests in the 30 days before surgery and cost of those tests. They found that “receipt of tests ranged from 0.9% (pulmonary function tests) to 46.8% (blood counts), and 65.2% of patients received at least one test”. Mean cost per patient for all tests was \$124.38. Higher Revised Cardiac Risk Index (RCRI, used as patient-specific risk) was strongly associated ((OR) > 2) with receipt of stress tests and echocardiograms, and more modestly associated [OR < 2] with receipt of most other tests. The authors observed that “higher-risk operations were strongly associated with receipt of most tests.” The authors concluded that “surgery-specific risk is strongly associated with receipt of most preoperative tests (Riggs, Bass, & Segal, 2018).”

Alzahrani et al. “aimed to evaluate unselected routine preoperative coagulation testing in children undergoing elective or invasive surgery to predict abnormal perioperative bleeding”. 2078 cases were included--1940 of which had normal coagulation tests, 77 of which had abnormal, and 61 did not have testing performed. 15 of these 77 patients had a normal re-test, and a total of 52 were confirmed “abnormal”. Of these 52, 45 had normal “factors” assay, and postoperative bleeding occurred in 3 cases. One of which was a post-operatively detected hemophilia, and two cases were surgical procedures with normal pre-operative testing. The authors concluded that “routine coagulation screening before surgery or invasive procedures to predict perioperative bleeding in unselected patients is not recommended. Our study emphasizes that selective preoperative testing is more appropriate (Alzahrani et al., 2019).”

Nelson et al. sought to evaluate the success of a program at Vanderbilt intended to reduce unnecessary preoperative testing. 56425 cases were included, and there was a significant reduction in preoperative testing performed. The reductions are as follows: electrocardiograms (61.90% to 31.66%), coagulation blood draws (37.57% to 29.74%), basic metabolic panels (70.64% to 51.29%), blood cell counts (71.38% to 51.42%) and chest x-rays (11.80% to 6.04%) after protocol changed. These changes were found not to increase cancellations, length of stay, or readmission (Nelson et al., 2019).

Keay et al. aimed to evaluate the “evidence for reductions in adverse events through preoperative medical testing and to estimate the average cost of performing routine medical testing”. The authors focused on cataract surgery evaluation, as cataract surgeries are often performed on older patients with significant comorbidities, and also because cataract surgery is high volume. The authors identified three randomized clinical trials that “compared routine preoperative medical testing versus selective or no preoperative testing for 21531 cataract surgeries”. Of the 21531 surgeries, 707 surgery-related adverse events occurred, with 353 occurring in the pre-testing group, and 354 occurring in the no-testing group. Most adverse events were cardiovascular in nature and occurred in the intra-operative period. The authors also noted that “routine preoperative medical testing did not reduce the risk of intraoperative (odds ratio = 0.99) or postoperative (odds ratio = 1.11) ocular adverse events, compared to the selective or no-testing cohorts. Overall, the authors concluded that their review demonstrated “that routine preoperative testing does not increase the safety of cataract surgery.” (Keay, Lindsley, Tielsch, Katz, & Schein, 2019)

Ding et al. evaluated the “prevalence and patient characteristics” associated with “low-value preoperative tests (LVTs)” prior to carpal tunnel release. Nine common LVTs were included, which are as follows: complete blood count (CBC), basic metabolic profile (BMP), electrocardiogram, urinalysis, coagulation testing, chest radiography, transthoracic echocardiogram, cardiac stress testing, and pulmonary function testing. A total of 572 patients were included and 248 had at least one LVT. The most common tests were ECG (31.3% of surgeries), CBC (27.3%), and BMP (23.6%). Older age, higher

Elixhauser comorbidity score, and general or regional anesthesia were all associated with higher odds of receiving any LVT. The authors concluded that “low-value preoperative tests were frequently received by patients undergoing CTR and were associated with anesthesia type, age, and number of comorbidities.” (Ding et al., 2020)

## V. Guidelines and Recommendations

### **American Society of Anesthesiologists (ASA, 2012)**

The ASA published guidelines regarding pre-operative testing in 2012.

- Routine testing of hemoglobin or hematocrit was not indicated. Some conditions that warrant testing include liver disease, extreme age, hematologic disorders, and history of bleeding or anemia. In general, type and invasiveness of procedure should also be considered when deciding to test.
- For coagulation studies, clinical indications may include bleeding disorders, liver dysfunction, and renal dysfunction.
- For serum chemistry tests (Potassium, Glucose, Sodium, Renal and Liver Function Studies), clinical indications include “perioperative therapies, endocrine disorders, risk of renal and liver dysfunction, and use of certain medications or alternative therapies”.
- Routine urinalysis is not indicated. Clinical indications such as presence of urinary tract infection symptoms or certain procedures such as urologic procedures may warrant urinalysis.
- “Pregnancy testing may be offered to female patients of childbearing age and for whom the result would alter the patient's management”. This recommendation was re-affirmed in 2016 (ASA, 2016)
- “Routine preoperative tests (i.e., tests intended to discover a disease or disorder in an asymptomatic patient) do not make an important contribution to the process of perioperative assessment and management of the patient by the anesthesiologist.”
- “Selective preoperative tests (i.e., tests ordered after consideration of specific information obtained from sources such as medical records, patient interview, physical examination, and the type or invasiveness of the planned procedure and anesthesia) may assist the anesthesiologist in making decisions about the process of perioperative assessment and management.” (ASA, 2012).

### **American Academy of Family Physicians (Feely et al., 2013)**

The AAFP released guidance on several routine pre-operative tests (Feely et al., 2013). Highlights of these guidelines include the following:



- The AAFP recommends against routine urinalysis in asymptomatic patients except “those undergoing surgical implantation of foreign material (e.g., prosthetic joint, heart valve) or invasive urologic procedures”.
- “Compelling historical findings (e.g., hypertension, heart failure, chronic kidney disease, complicated diabetes mellitus, liver disease) and certain medications (e.g., diuretics, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, nonsteroidal antiinflammatory drugs, digoxin) should drive the decision to perform preoperative electrolyte and creatinine testing.”
- “...preoperative glucose assessment should be undertaken when the results would alter perioperative management. The guidelines suggest that preoperative random glucose measurement could be considered in patients at very high risk of undiagnosed diabetes on the basis of history, examination, or use of certain medications (e.g., glucocorticoids), and in patients with signs or symptoms of undiagnosed diabetes.”
- “Instead, the consensus is to recommend testing for select patients based on conditions that would increase the pretest probability of diagnosing anemia (e.g., a chronic inflammatory condition, chronic kidney disease, chronic liver disease, clinical signs or symptoms of anemia) or procedures in which significant blood loss is anticipated.”
- “As with CBC testing, the consensus is that coagulation testing be reserved for patients with medical conditions associated with impaired hemostasis (e.g., liver disease, diseases of hematopoiesis), patients taking anticoagulants, and those whose history or examination findings suggest an underlying coagulation disorder (e.g., history of spontaneous bruising or excessive surgical bleeding, family history of a known heritable coagulopathy).”
- “Patients in their usual state of health who are undergoing cataract surgery do not require preoperative testing” (Feely et al., 2013).

### **Routine preoperative tests for elective surgery, UK (NICE, 2016)**

#### *Recommendations relevant for all types of surgery*

##### Pregnancy tests:

- Carry out a pregnancy test with the woman's consent if there is any doubt about whether she could be pregnant.

##### Sickle cell disease or sickle cell trait tests:

- Do not routinely offer testing for sickle cell disease or sickle cell trait before surgery.

##### HbA1c testing for people without diagnosed diabetes:

- Do not routinely offer HbA1c testing before surgery to people without diagnosed diabetes.
- HbA1c testing for people with diabetes:

- 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.
- Offer HbA1c testing to people with diabetes having surgery if they have not been tested in the last 3 months.

Urine tests:

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

### **Recommendations for specific surgery grades (minor, intermediate, and major or complex) and ASA grades (NICE, 2016)**

The following recommendations are specific to surgery grade and ASA grade. “Minor” surgery examples include excising skin lesions or draining a breast abscess, “intermediate” includes a knee arthroscopy, and “major” may be a total joint replacement or thyroidectomy. The ASA has also graded “fitness” of a patient to undergo anesthetic. Grade 1 is a “normal healthy patient”, grade 2 is “a patient with mild systemic disease”, grade 3 is “a patient with severe systemic disease”, and grade 4 is “a patient with severe systemic disease that is a constant threat to life”. NICE includes recommendations on the following four lab tests: full blood count, haemostasis, kidney function, and lung function/arterial blood gas.

For minor surgery, only kidney function tests may be considered in patients at risk of acute kidney injury (AKI) in ASA grades 3 or 4.

For intermediate surgery, a full blood count should only be considered in ASA grades 3 or 4 and for patients with cardiovascular or renal disease. Haemostasis should only be considered in patients with chronic liver disease, although clotting status may be tested with point of care testing. Kidney function testing may be considered in patients at risk for AKI for ASA grade 2 and should be tested in ASA 3 or 4 patients.

For major or complex surgery, a full blood count is recommended for all ASA grades. Haemostasis and lung function/arterial blood gas for major surgery follow the intermediate surgery recommendations. Finally, kidney function tests should be performed for ASA grades 2 and up, and may be considered in patients of ASA grade 1 (NICE, 2016).

### **European Society of Anaesthesiology (ESA) (De Hert et al., 2018)**

The (ESA) refers to the above NICE guidelines when discussing which pre-operative tests should be used for elective surgery.

Other relevant recommendations include:

- “We suggest considering assessment of cardiac troponins in high-risk patients, both before and 48 to 72 h after major surgery.”
- “We suggest considering BNP measurement for obtaining independent prognostic information on peri-operative and late cardiac events in high-risk patients.”
- “We suggest using calculated GFR instead of serum creatinine for renal function evaluation and prediction of postoperative morbidity and mortality in patients with impaired renal function undergoing noncardiac procedures.”

- “We suggest that blood sugar is not routinely measured at pre-operative assessment in otherwise healthy individuals scheduled for elective noncardiac surgery, except for major orthopaedic or vascular surgery.”
- “We suggest blood glucose testing and testing for HbA1c in patients with known diabetes mellitus and patients scheduled for major orthopaedic and vascular surgery.”
- “We suggest laboratory tests to detect pathological glucose/HbA1c concentrations and anaemia in the obese.”
- “We suggest that simple laboratory tests like platelet count may have a prognostic value and can be used in the evaluation.”
- “We recommend using only the combination of GGT and CDT as biomarkers for the preoperative identification of AUD, as they provide the highest sensitivity.”
- “We suggest using pre-operative hsTnT measurement to aid risk assessment in patients at risk of coronary artery disease and in patients undergoing major surgery.”
- “We recommend that pre-operative measurements of natriuretic peptides be used for risk stratification in intermediate or high-risk patients undergoing vascular or major thoracic surgery.”
- “We suggest pre-operative measurement of natriuretic peptides for risk stratification in highrisk patients undergoing major general or orthopaedic surgery.”
- “...no recommendation can be made for the measurement of this biomarker [Copeptin] until these results have been confirmed by further prospective studies, and in other groups.”

The ESA also notes that “an extensive systematic review concluded that there was no evidence to support routine pre-operative testing” (De Hert et al., 2018).

#### **American Society for Clinical Pathology (ASCP, 2013)**

The ASCP released a recommendation (2013) as part of the Choosing Wisely campaign that states:

“Avoid routine preoperative testing for low risk surgeries without a clinical indication. Most preoperative tests (typically a complete blood count, Prothrombin Time and Partial Prothomboplastin Time, basic metabolic panel and urinalysis) performed on elective surgical patients are normal. Findings influence management in under 3% of patients tested. In almost all cases, no adverse outcomes are observed when clinically stable patients undergo elective surgery, irrespective of whether an abnormal test is identified. Preoperative testing is appropriate in symptomatic patients and those with risks factors for which diagnostic testing can provide clarification of patient surgical risk (ASCP, 2013).”

#### **Society of General Internal Medicine (SGIM, 2017)**

The SGIM released a recommendation (SGIM, 2017) as part of the Choosing Wisely campaign which states: “Don’t perform routine pre-operative testing before low-risk surgical procedures. The goal of the preoperative evaluation is to identify, stratify, and reduce risk for major postoperative complications. The crucial elements of this evaluation are a careful history and physical examination. Preoperative testing for low-risk surgical procedures typically does not reclassify the risk estimate established through the history and physical examination, may result in unnecessary delays, lead to downstream risk from additional testing, and add avoidable costs. Clinicians should not routinely order testing before low-risk surgery (SGIM, 2017).”

**Institute for Clinical Systems Improvement (ICSI, 2014, 2020)**

“The reason to obtain a preoperative hemoglobin should be based on the patient's underlying medical condition and the planned procedure.”

The ICSI recommends testing for potassium when a patient is taking “digoxin, diuretics, ACE inhibitors or angiotension receptor blockers”.

The ICSI recommends performing a pregnancy test in the following three circumstances: “a. is sexually active and history suggests possible pregnancy, e.g., delayed menstruation, or b. patient is concerned about possible pregnancy, or c. the possibility of pregnancy is uncertain (ICSI, 2014).”

The ICSI also published an updated edition of their Perioperative Guideline. Their relevant statements include:

- “Do not routinely test all patients undergoing elective, noncardiac surgery. The need for testing should be guided by individual patient’s clinical risk factors (based on medical history and physical examination) and the risk of major adverse cardiac event (morbidity or mortality) associated with the planned procedure.”
- “Do not routinely test for hemoglobin preoperatively in healthy, asymptomatic patients. Testing for preoperative hemoglobin level should be considered in: patients with a history of anemia or history suggesting recent blood loss or anemia and the planned procedure may lead to significant blood loss or physiologic stress or patients with prior or planned anticoagulation.”
- “Do not routinely test for potassium or sodium level preoperatively in healthy, asymptomatic patients. Testing may be indicated in: patients who are on diuretic therapy, patients with kidney disease (stages 3–5), patients on potassium replacement therapy, or patients undergoing bowel preparation.”
- “Do not routinely test for creatinine levels in healthy, asymptomatic patients. Testing may be indicated in patients with known kidney disease or patients with a comorbid condition (e.g., diabetes, hypertension) that carries increased risk of acute kidney injury or kidney disease”.
- “Do not routinely conduct urine tests for pregnancy. However, patients of childbearing age should be asked if there is a possibility they might be pregnant. Pregnancy testing is indicated in: patients planning to undergo surgeries involving the uterus (e.g., hysterectomy, myomectomy), uterine cavity surgery (e.g., dilation and curettage, endometrial ablation), or surgery that impacts blood flow to the uterus (e.g., endovascular surgeries that disrupt aortic blood flow, procedures involving the uterine arteries).
- “Do not routinely perform coagulation tests before surgery unless indicated. Indications for testing may include the following: patients with potential bleeding/ clotting problem [sic], patients with a known history of bleeding/clotting abnormalities, patients with recent history suggesting the potential for bleeding/clotting problems, patients who are currently taking anticoagulant therapy, and patients who may need postoperative anticoagulation (where a baseline may be needed).”

- “Consider glucose testing in patients with risk factors for diabetes (as defined by USPSTF recommendations), or if a primary care provider feels that diagnosis of diabetes would alter the plan for surgery.”
- “Consider obtaining a preoperative HbA1c test value, if not done in the past three months, on patients with known diabetes during preoperative clinic visit.” (ICSI, 2020)

#### **American Society of Hematology-American Society of Pediatric Hematology/Oncology (ASH/ASPHO) (ChoosingWisely) (ASH/ASPHO, 2019)**

ASH/ASPHO published this recommendation through ChoosingWisely. In it, they recommend “Don’t perform routine pre-operative hemostatic testing (PT, aPTT) in an otherwise healthy child with no prior personal or family history of bleeding”, stating that “Preoperative hemostatic screening in healthy pediatric patients with no personal or family history of excessive bleeding does not effectively identify those who will have unexpected surgical bleeding” (ASH/ASPHO, 2019).

#### **Canadian Anesthesiologists' Society (CAS) (Dobson et al., 2020)**

This guideline is published annually, and “supersedes all previously published versions of this document”. Their pre-operative statements and comments include the following:

“Laboratory testing should not be performed on a routine basis but should be obtained only when results will change perioperative management. Laboratory investigations should be performed when indicated by the patient’s medical status, drug therapy, and the nature of the proposed procedure. Routine laboratory blood testing, electrocardiograms, and chest radiographs are not recommended for asymptomatic patients having low-risk surgery.”

CAS further lists examples of low-risk surgery, which include “cataract surgery or minor ambulatory procedures”.

- A complete blood count “may be considered based on the potential for significant blood loss, extremes of age (i.e., < one year), liver or hematological disease, history of anemia or malignancy.”
- A sickle cell screen “should be offered with counselling to patients of high risk ethnicity.”
- An assessment of partial thromboplastin time/international normalized ratio “may be considered with conditions or medications associated with impaired coagulation (e.g., liver disease, malnutrition), history of excessive bleeding, or a family history of heritable coagulopathies), or for patients on oral or parenteral anticoagulant therapy.”
- Electrolyte assessment “may be considered with known or compelling findings in favour of hypertension, congestive heart failure, chronic renal failure, complicated diabetes, liver disease, pituitary-adrenal disease, malnutrition or for patients taking diuretics, angiotensin

converting enzyme inhibitors, angiotensin receptor blockers, and other therapy affecting electrolytes.”

- Creatinine and estimated glomerular filtration rate (eGFR) “may be considered as above for electrolytes, also with advanced age and for patients taking medications potentially affecting renal function, for patients receiving direct oral anticoagulants, and as required for calculating perioperative risk indices. eGFR is recommended to assist with renal outcome prediction.”
- Fasting glucose level “may be considered for diabetics, preoperatively on day of surgery to guide glycemic control, for patients on glucocorticoid therapy, or as screening for body mass index > 40 or a very high risk of diabetes based on signs and symptoms.”
- Hemoglobin A1c “may be considered for known diabetics as early as possible before surgery (ideally at time of surgical referral) if results would change management.”
- Pregnancy testing “should be offered to women of childbearing age based on any reasonable likelihood of pregnancy, on the reliability of menstrual history, and if the results will cancel or change the procedure or the anesthetic management.”

**Royal College of Anaesthetists (RCOA, 2019)**

This book of guidelines includes a chapter on pre-operative testing. Their relevant comments include:

“Routine blood testing is rarely necessary [for children]. There are exceptions to this such as sickle cell status.” (RCOA, 2019)

**VI. State and Federal Regulations, as applicable**

Most routine pre-operative tests are FDA approved as routine laboratory procedures.

**VII. Applicable CPT/HCPCS Procedure Codes**

| <b>Code Number</b> | <b>Code Description</b>                  |
|--------------------|--|
| 80047              | Basic metabolic panel (Calcium, ionized) |
| 80048              | Basic metabolic panel (Calcium, total)   |

|       |   |
|-------|---|
| 80050 | General health panel  |
| 80053 | Comprehensive metabolic panel   |
| 81000 | Urinalysis, dip stick or tab reagent  |
| 81001 | Urinalysis, by dip stick or tablet reagent for bilirubin, glucose, hemoglobin, ketones, leukocytes, nitrite, ph, protein, specific gravity, urobilinogen, any number of these constituents; automated, with microscopy        |
| 81002 | Urinalysis, by dip stick or tablet reagent for bilirubin, glucose, hemoglobin, ketones, leukocytes, nitrite, ph, protein, specific gravity, urobilinogen, any number of these constituents; non-automated, without microscopy |
| 81003 | Urinalysis, automated, without microscopy   |
| 81005 | Urinalysis; qualitative or semiquantitative   |
| 81025 | Urine pregnancy test, visual color  |
| 84702 | Gonadotropin, chorionic (hCG); quant  |

|       |  |
|-------|--|
| 84703 | Gonadotropin, chorionic (hcg);<br>qualitative  |
| 85014 | Hematocrit   |
| 85018 | Hemoglobin   |
| 85025 | Complete CBC, automated (Hgb, Hct, RBC, WBC, platelet ct) & automated diff WBC                           |
| 85027 | Complete CBC, automated (Hgb, Hct, RBC, WBC, platelet ct)  |
| 85610 | Prothrombin time   |
| 85730 | Thromboplastin time, PTT   |
| 86904 | Blood typing, serologic; antigen screening for compatible unit using patient serum,<br>per unit screened |
| 86920 | Compatibility test each unit;<br>immediate spin technique  |
| 87086 | Culture, bacterial; quantitative colony count, urine   |
| 87088 | Culture, bacterial; with isolation and presumptive identification of each isolate,<br>urine              |



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## IX. Revision History

| Revision Date | Summary of Changes     |
|---------------|------------------------|
| 01/01/2022    | Initial Effective Date |
| 04/30/2022    | Archival of policy     |