

Confluence Health Pre-Op Guidelines

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Anesthesia

Previous problems with anesthesia should be documented in detail and communicated to the surgeon's office with instructions to alert the hospital prior to surgery.

Cardiovascular

EKG indications:

- A preoperative EKG is indicated if the patient has one or more of the following: Cardiovascular signs or symptoms (Angina, SOB [new, progressive, or present with very little activity], or orthopnea
- Undergoing Elevated Risk Surgery and:
 - Revised Cardiac Risk Index greater than or equal to 1, or
 - Age is greater than or equal to 60
 - Undergoing Aortic or Peripheral Vascular Surgery

Active cardiac conditions:

• If any unstable cardiac conditions are present, then consider delaying procedure until active cardiac condition is optimally managed, unless emergent surgery is indicated. Optimal management of several cardiac conditions has been defined by Clinical Practice Guidelines published jointly by the ACC, AHA, and other organizations:

- o Management of patients with atrial fibrillation AHA/ACC/HRS 2014 and 2019 AHA/ACC/HRS Focused Update
 - o Management of valvular heart disease AHA/ACC 2020
 - o Management of heart failure ACC/AHA 2022
 - o Management of ST-elevation myocardial infarction ACC/AHA 2013 (18)
 - o Focused update: diagnosis and management of patients with stable ischemic heart disease ACC/AHA/AATS/PCNA/SCAI/STS 2014
 - o 2014 AHA/ACC Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes
 - o Red Blood Cell Transfusion: 2016 Clinical Practice Guidelines from the AABB
 - o 2016 AHA/ACC Guideline on the Management of Patients With Lower Extremity Peripheral Artery Disease
 - o 2020 AHA/ACC Guideline for the Diagnosis and Treatment of Patients With Hypertrophic Cardiomyopathy
 - o 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization
 - o Management of adults with congenital heart disease ACC/AHA 2008
- 2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease

Recent MI:

- At least 60 days should elapse after a MI before noncardiac surgery in the absence of a coronary intervention.
- If patient had an MI in the last 3 months, recommend cardiology consult for perioperative planning. A recent MI, defined as having occurred within 6 months of noncardiac surgery, was also found to be an independent risk factor for perioperative stroke, which was associated with an 8-fold increase in the perioperative mortality rate

Elective Non-cardiac Surgery after recent PCI:

- Recent guidelines continue to recommend that elective noncardiac surgery be delayed at least:
 - o 14 days after balloon angioplasty,
 - o 30 days after bare-metal stent implantation, and
 - o Optimally six months after drug-eluting stent placement

PCI with drug-eluting stent:

- If patient had a PCI with drug-eluting stent in the past 6 months, then recent standard recommendation is to delay an elective procedure until 6 months of clopidogrel (Plavix) or other thienopyridine treatment is completed. If surgery needs to be completed sooner, consult cardiologist. Noncardiac surgery after [drug-eluting stent] implantation may be considered after 3 months **if the risk of further delay is greater than the expected risks of ischemia and stent thrombosis**
- If stent placed greater than 6 months ago, then stop clopidogrel (Plavix) or other thienopyridine 7 days prior to procedure, and resume after procedure when surgeon recommends.

PCI with bare metal stent:

- • If patient had a PCI with bare metal stent in the past 4 to 6 weeks, then if possible delay surgery until 30 days post stent then proceed with surgery, continuing aspirin.
- • Patients undergoing urgent noncardiac surgery during the first 30 days after bare metal stent implantation, dual anti-platelet therapy should be continued unless the relative risk of bleeding outweighs the benefit of the prevention of stent thrombosis.

Management of the perioperative antiplatelet therapy should be determined by a consensus of the surgeon, anesthesiologist, cardiologist, and patient, who should weigh the relative risk of bleeding versus prevention of stent thrombosis

In patients who have received coronary stents and must undergo surgical procedures that mandate the discontinuation of P2Y12 platelet receptor–inhibitor therapy, it is recommended that aspirin be continued if possible and the P2Y12 platelet receptor–inhibitor be restarted as soon as possible after surgery.

Revised Cardiac Risk Index:

- In patients having Elevated Risk surgery, if RCRI greater than or equal to 2, and activity tolerance is unknown or less than 4 METs, consider stress testing if further testing will impact patient decision making (e.g., decision to perform original surgery or willingness to undergo CABG or PCI, depending on the results of the test) or impact aspects of perioperative care.
- If RCRI equals 0 or 1, no further cardiac testing is needed.

Beta Blocker therapy:

- Beta blockers should be continued in patients undergoing surgery who have been on beta blockers chronically.
 - It may be reasonable to begin perioperative beta blockers in patients with higher-risk myocardial ischemia noted in preoperative stress testing.
- Starting beta blockers before surgery may be reasonable if a patient has three or more RCRI risk factors.
- The decision to begin beta blockers should be influenced by whether a patient is at risk for stroke, or has other relative contraindications to beta blockers.
- In patients in whom beta blocker therapy is initiated preoperatively, only begin perioperative beta blockers if there is enough time to assess safety and tolerability (at least 1 week before surgery and ideally 30 days or more before surgery).

Malignant hypertension:

If patient's SBP is greater than 180 or DBP greater than 110, then optimize HTN management prior to procedure. This may require delaying the procedure.

Antihypertensive therapy:

If patient is taking a loop diuretic, hold morning of procedure. Continue all other antihypertensives without interruption.

ACEi/ARB therapy:

It is reasonable to continue ACEi/ARB therapy perioperatively. Consider holding the dose prior to surgery if baseline systolic BP < 120 or baseline diastolic BP < 80. If ACEi/ARB is held preoperatively, it should be restarted as soon as possible postoperatively.

Lipid therapy:

If patient is on niacin, fibric acid derivatives, or bile acid sequestrants, stop day prior to surgery and resume at hospital discharge.

Statin therapy:

- If patient is already on a statin, continue perioperatively.
- Perioperative initiation of statin use is reasonable in patients undergoing vascular surgery.
- Perioperative initiation of statins may be considered in patients with clinical indications undergoing elevated-risk procedures.

Antiplatelet therapy:

Aggrenox: If patient is taking Aggrenox, stop 7 days before procedure.

Aspirin:

- Continue aspirin therapy for secondary prevention when possible. If the surgeon states that continuing aspirin will negatively impact the surgical outcome, then stop 7 days prior to procedure and resume morning after procedure or when surgeon recommends.
- It may be reasonable to continue aspirin when the risk of potential increased cardiac events outweighs the risk of increased bleeding.
- Initiation or continuation of aspirin is not beneficial in patients undergoing elective noncardiac **noncarotid** surgery who have not had previous coronary stenting unless the risk of ischemic events outweighs the risk of surgical bleeding.

Clopidogrel and Prasugrel : If patient is on Clopidogrel (Plavix) or Prasugrel (Effient) for stent placed less than 6 months ago, consult cardiology. If patient is on Clopidogrel or Prasugrel for other cardiovascular indications, then stop Clopidogrel (Plavix), Prasugrel (Effient), or other thienopyridine 7 days prior to procedure, and resume after procedure when surgeon recommends.

Anticoagulation therapy:

Patient needs to be seen by the anticoagulation clinic if taking warfarin or any full anticoagulation agent. If patient has not been seen, notify surgeon's office to send in referral. The peri-procedural anticoagulation clinic plan needs to be included with surgical packet. Routine cataract surgery is an exception to this rule.

Heart Failure:

- 30-day postoperative mortality rate was significantly higher in patients with nonischemic HF (9.3%), ischemic HF (9.2%), and atrial fibrillation (AF) (6.4%) than in those with CAD (2.9%).
- Stability of a patient with HF plays a significant role in perioperative mortality rates for patients with stable HF were not higher than for the control group without HF, but these patients with stable HF were more likely than patients without HF to have longer hospital stays, require hospital readmission, and have higher long-term mortality rates
- Patients who undergo surgery within four weeks of diagnosis of HF or AF have higher perioperative mortality than if surgery is > 4 weeks after diagnosis.
- Survival after surgery for those patients with a LVEF $\leq 29\%$ is significantly worse than for those with a LVEF $> 29\%$. LVEF at rest $< 35\%$ indicates greatest risk for postoperative complications
- Evaluation of LV function is reasonable for patients with HF with worsening dyspnea or other change in clinical status.
- Reassessment of LV function in clinically stable patients with previously documented LV dysfunction may be considered if there has been no assessment within a year.

Valvular Heart Disease:

- Patients with suspected valvular heart disease should undergo echocardiography to quantify the severity of stenosis or regurgitation, calculate systolic function, and estimate right heart pressures.
- Patients with clinically known or suspected moderate or greater degrees of valvular stenosis or regurgitation should undergo preoperative echo if there has been either:

- 1) no prior echo within one year, or
- 2) a significant change in clinical status or physical examination since the last echo

Patients with Aortic Stenosis at increased risk for cardiac events during noncardiac surgery if:

- 1) Mean gradient >45-50 mmHg and/or valve area AVA <0.8 cm²
- 2) Left ventricular systolic dysfunction
- 3) Symptomatic AS
- 4) Associated significant mitral regurgitation or other valvular disease
- 5) ≥18 mm Hg increase in the mean gradient during exercise
- 6) Significant coronary artery disease

Mitral Regurgitation

- 1) When severe, LV function is the issue; Ejection fraction < 35% higher risk
- 2) Severe ischemic MR presents higher risk of postop complications (39% complication rate vs. 13% complication with Severe non-ischemic MR)

Cardiovascular Implantable Electronic Devices:

Before elective surgery in a patient with a pacemaker or implantable cardio-defibrillator, the clinician following the device should communicate in advance to plan perioperative management of the device.

Adult Congenital Heart Disease:

When possible, perform the preoperative evaluation of surgery for patients with ACHD in a regional center specializing in congenital cardiology, particularly for patient populations that appear to be at particularly high risk (e.g., those with a prior Fontan procedure, cyanotic ACHD, pulmonary arterial hypertension, clinical HF, or significant dysrhythmia).

Pulmonary Hypertension

Preoperative risk factors for 30 day morbidity and mortality include:

- NYHA Functional class >II
- History pulmonary embolism
- History obstructive sleep apnea
- Intermediate or high risk surgery
- Anesthesia > 3 hours

Preoperative warning "signs":

- RVSP / SBP > 0.66
- RVH on EKG
- CXR showing an enlarged main pulmonary artery and enlarged hilar vessels

Endocrine

Diabetes with HbA1c > 7.0:

There is good evidence that poorly controlled diabetes contributes to delayed post-operative wound healing and increased rate of wound infection. Thus, for Hemoglobin A1c greater than 7.0 or elevated fasting sugars at the time of surgery, it may be reasonable to delay elective procedures. There are not guidelines on exact levels of A1c or fasting sugar at which surgery should be postponed so it will be an individualized decision.

Diabetic medications:

- Hold all oral hypoglycemics the morning of surgery.
- Hold short acting insulin the morning of surgery.

Long-acting insulin:

- In Type I diabetes, no change in any pre-op dosing.
- In Type II diabetes, cut pre-surgery dose (night before or morning of) by half. o Intermediate acting insulin:

Intermediate acting insulin:

- In Type I diabetes, no change in pre-op dosing.
- In Type II diabetes, reduce dose by half the morning of surgery.

Mixed insulins:

- Give ½ of usual total AM dose of the mixed insulin as intermediate acting insulin alone on the morning of surgery.

Consider suggesting post-op Glucose Control Team consult (at CWH) for patients treated with insulin.

SGLT2 inhibitor agents:

- FDA recommends holding for 3 days prior to surgery:
 - empagliflozin (Jardiance)
 - dapagliflozin (Farxiga and Forxiga)
 - canagliflozin (Invokana)
- For ertuglozin (Steglatro) it is recommended to hold for 4 days prior to surgery.

*Continuing SGLT2 inhibitors preoperatively can lead to poor patient outcomes and increased length of stay due to euglycemic diabetic ketoacidosis.

GLP-1 receptor agonists:

- Recommended by the ASA to hold on the day of surgery for daily dosing or for the previous week if dosed weekly:
 - dulaglutide (Trulicity)
 - exenatide (Bydureon/Byetta)
 - semaglutide (Ozempic/Rybelsus)

*Concern for GI side effects, especially for delayed gastric emptying which can increase the risk for pulmonary aspiration during an anesthetic.

Steroid therapy:

- Patients currently taking glucocorticoids < 3 weeks at any dose, or < 5 mg prednisone equivalent qAM of any duration, do not need stress dose steroids. They should continue their usual glucocorticoid dose peri-operatively without change.
- Patients currently taking >20 mg per day of prednisone equivalent/day for ≥ 3 weeks, additional perioperative glucocorticoid coverage is suggested based on procedure type:
 - For minor procedures or surgery under local anesthesia (eg, inguinal hernia repair) take usual morning steroid dose. No extra supplementation is necessary.
 - For moderate surgical stress (eg, lower extremity revascularization, total joint replacement) take usual morning steroid dose. Give 50 mg hydrocortisone intravenously just before the procedure and 25 mg of hydrocortisone every 8 hours for 24 hours. Resume usual dose thereafter.
 - For major surgical stress (eg, esophagogastrectomy, total proctocolectomy, open heart surgery) take usual morning steroid dose. Give 100 mg of intravenous hydrocortisone before induction of anesthesia, and 50 mg every 8 hours for 24 hours. Taper dose by half per day to maintenance level.
- Patients who historically received glucocorticoid therapy in the past year for < 3 weeks duration at any dose, or any duration at doses < 5 mg prednisone equivalent, do not need perioperative glucocorticoid dosing.

For all other patients including any patient on chronic steroid therapy who does not fall into one of the above categories. If time permits, consider referring these patients for preoperative testing to determine their HPAA integrity. If testing is unavailable, the anesthesiologist must exercise his/her clinical judgment as to whether to administer stress-dose steroids based on the patient's perioperative condition (e.g., degree of hemodynamic stability) and surgical risk.

- For patients who have received 3 or more intra-articular or spinal glucocorticoid injections within 3 months of surgery, HPA axis evaluation should be done as per #4 above.

- All patients with current or historical glucocorticoid use within the past year should be observed for signs of adrenal crisis (unexplained nausea/vomiting, hypotension or orthostasis, hyponatremia, hyperkalemia, mental status changes), and etomidate should potentially be avoided for anesthesia

Geriatrics

ACS NSQIP®/AGS BEST PRACTICE GUIDELINES:

Optimal Preoperative Assessment of the Geriatric Surgical Patient

- Preoperative Care Checklist for Patients 65 or older:
- Assess the patient's **cognitive ability** and **capacity** to understand the anticipated surgery
- Screen the patient for **depression**
- Identify the patient's risk factors for developing postoperative **delirium** (see Neurological Section below)
- Screen for **alcohol** and other **substance abuse/dependence**
- Perform a preoperative **cardiac** evaluation according to the American College of Cardiology/American Heart Association (ACC/AHA) algorithm for patients undergoing noncardiac surgery
- Identify the patient's risk factors for postoperative **pulmonary** complications and implement appropriate strategies for prevention
- Document **functional status** and history of **falls**
- Determine baseline **frailty** score
- Assess patient's **nutritional status** and consider preoperative interventions if the patient is at severe nutritional risk
- Take an accurate and detailed **medication history** and consider appropriate perioperative adjustments. Monitor for **polypharmacy**
- Determine the patient's **treatment goals** and **expectations** in the context of the possible treatment outcomes
- Determine patient's **family** and **social support system**
- Order appropriate preoperative **diagnostic tests** focused on elderly patients

Hematologic

Anemia:

If patient has known history of anemia, check pre-op CBC. If pre-op hemoglobin < 8, consider delay of procedure if possible for optimization of anemia. For new discovery of anemia, recommend appropriate evaluation and treatment prior to surgery.

Hepatic

Acute Hepatitis:

Contraindication to elective surgery. Mortality can be as high as 30%.

AST/ALT should be < 2X normal with a normal INR and bilirubin before proceeding

If secondary to alcohol, patient should be abstinent for 12 weeks prior to proceeding with surgery.

Chronic Liver Disease and Cirrhosis:

Calculate MELD Score or Child-Turcotte-Pugh Score (preferred for risk stratification prior to Noncardiac Surgery) to aide in deciding necessity of elective surgery.

Patient should have GI consultation within six months prior to Noncardiac Surgery.

Preop Management:

- Evaluate bilirubin, serum albumin, liver enzymes, blood glucose, serum sodium and creatinine, INR and platelet count
- Consider occult Hepatic Encephalopathy if the patient is a poor historian and treat with lactulose preoperatively if needed
- Attain fluid balance (diuresis, salt restriction, IV albumin, etc.)
- Aggressive bowel regimen

- Look for malnutrition and if present treat with enteral formula high in carbohydrates and lipids and low in amino acids
- Avoid NSAID's
- Treat coagulopathy (may respond to vitamin K)
- If in decompensated cirrhosis, should seek referral for Liver Transplant evaluation prior to elective surgery

Neurological

Delirium Risk:

Patients are identified as having potentially higher risk for POD with one or more of the following:

- Positive answer to "current problem with drinking too much alcohol" on the Quick Screen
- Undergoing Open Abdominal Aortic Aneurism Surgery
- Undergoing Nonvascular Thoracic Surgery
- 70 years or older and having intermediate or high risk surgery

If one of the above present, then Perioperative Nurse Case Manager (PNCM) performs Telephone Interview for Cognitive Status (TICS) and performs the rest of the screening tests and assess percentage risk of POD:

Table 6.—Summary of the Clinical Prediction Rule for Postoperative Delirium

Risk Factor	Points
Age \geq 70 y	1
Alcohol abuse	1
TICS score $<$ 30*	1
SAS class IV†	1
Markedly abnormal preoperative sodium, potassium, or glucose level‡	1
Aortic aneurysm surgery	2
Noncardiac thoracic surgery	1
Total Points	Risk of Delirium, %§
0	2
1 or 2	11
\geq 3	50

SPECIFIC ACTIVITY SCALE (SAS)
Class IV if the patient cannot do any of the following:
Shower without stopping
Strip and make a bed
Mop floors
Clean Windows
Walk a mile in $<$ 25 minutes
Bowl
Play golf (walk and carry clubs)
Push a power lawn mower

*TICS indicates Telephone Interview for Cognitive Status (scores $<$ 30 suggest cognitive impairment).

†SAS indicates Specific Activity Scale (class IV represents severe physical impairment).

‡Markedly abnormal levels were defined as follows: sodium, $<$ 130 or $>$ 150 mmol/L; potassium, $<$ 3.0 or $>$ 6.0 mmol/L; or glucose, $<$ 3.3 or $>$ 16.7 mmol/L ($<$ 60 or $>$ 300 mg/dL).

§Estimates of risk were based on the true incidence of delirium in the validation population.

PNCM will add the numerical score and the percentage risk for POD calculated from the above Clinical Prediction Rule for Postoperative Delirium to the Neuro section of the Template Preop Note.

The following should be addressed with patients with a moderate (11%) or high risk (50%) of POD:

- Discuss possibility of POD with the patient and their family
- Ensure the patient has had visual or auditory assessments preoperatively. Ensure that the patient brings glasses and hearing aids with them to the hospital
- Correct any preoperative electrolyte abnormality
- Ensure optimal glucose control
- Explore alcohol dependence treatment with the patient and their family
- Ensure treatment of Depression if present

- Correct nutritional deficiency indicated by Serum Albumin < 3.
- Recommend institution of Delirium Prevention Maneuvers Postoperatively

Elective Surgery after Recent CVA:

If history of stroke exists, consider delaying elective surgery at least 6 months and preferably 9 months from time of incident stroke. Consider nonsurgical treatment in discussion with the patient and caregivers as an alternative to surgery in patients with elevated risk of stroke.

Pulmonary

COPD with FEV1 <1 liter:

- If patient has COPD and intermediate or high risk surgery, consider pulmonary consult pre-operatively if:
 FEV <1.0L, the patient cannot walk 100 feet,
 They are on maximal inhaler therapy (which includes a short acting beta-agonist, a steroid inhaler and a long-acting control medicine such as tiotropium or long acting beta-agonist).

COPD with worsening symptoms:

- If current pulmonary status can be improved, consider optimizing management prior to surgery.
- If only on a rescue inhaler, then consider adding tiotropium (SPIRIVA)
- If on a rescue inhaler and tiotropium, then consider adding SYMIBCORT (or first foradil then budesonide). Maximal inhaler therapy is defined as rescue inhaler, tiotropium, inhaled corticosteroid and long acting control agent such as foradil.
- If still symptomatic despite being on maximal inhaler therapy, then patient needs pre-operative pulmonary consultation.
- If already on maximal inhaler therapy, consider Solu-Medrol 60 mg pre-operatively and oral steroids post-operatively.

Asthma:

- If current pulmonary status can be improved, consider optimizing management prior to surgery.
- If only on a rescue inhaler, add inhaled corticosteroid (ICS) or Montelukast.
- If already on ICS or Montelukast, then add long acting beta-agonist or Symbicort .
- If on Symbicort and still symptomatic, add Montelukast if not on or add long acting beta agonist and inhaled corticosteroid.

Obstructive sleep apnea:

If patient has known obstructive sleep apnea and symptoms are not controlled or patient is noncompliant with CPAP or BiPAP, recommend sleep consult pre-operatively. If patient is controlled and compliant, recommend patient bring CPAP machine to hospital.

STOP-BANG:

- If STOP-BANG is ≤ 2 , proceed with surgery.
- If patient is having intermediate or high risk surgery and STOP-BANG is 3-5 and has comorbidities present (CHF, HTN, Stroke, Arrhythmias, CAD, DM), serum $\text{HCO}_3^- > 28$, or room air $\text{O}_2 < 94\%$, consider referral to pulmonary medicine. If no co-morbidities are present, document score and proceed with surgery.
- If STOP-BANG is 6-8, consider referral to pulmonary medicine.

Pulmonary Hypertension (see Pulmonary Hypertension in Cardiovascular Section):

Unless the risks of delay outweigh the potential benefits, preoperative evaluation by a pulmonary hypertension specialist before noncardiac surgery can be beneficial for patients with pulmonary hypertension.

Smoking

- Postoperative Pulmonary Complications (PPCs) higher for patients with >20 pack year history
- Smoking cessation 4 weeks preoperatively reduces risk of PPCs
- Any smoking cessation is helpful; brief duration of cessation does not increase PPC risk

Renal

Decreased GFR:

If patient has GFR < 60 or worse, there is an increased risk of acute kidney injury and is associated with an increased risk of CAD and CVD.

Periop risk of postoperative complications is higher if GFR < 30. Joint replacement patients see increased risk with GFR < 50.

LV dysfunction increases surgical morbidity and mortality in patients with End Stage Renal Disease

***Patients with ESRD on dialysis should have a Nephrology consultation prior to elective surgery.**

*Consider Nephrology consultation in patients with GFR < 30 and having elevated (intermediate or high) risk surgery.

Contrast nephropathy prevention:

If patient is at risk for contrast nephropathy, recommend hydration IV 0.9 NS or oral, and avoid repeated exposures or high osmolality contrast.

Risks for Perioperative Acute Kidney Injury (AKI):

Age > 65	Male
African American	Morbid Obesity (BMI > 40)
CKD especially with Proteinuria	Liver Disease
LV Dysfunction	Atrial Fibrillation
Peripheral Vascular Disease	Diabetes and Poor Glycemic Control
Hypertension	Malignancy
COPD	Anemia
Hypoalbuminemia	Elevated CRP (Chronic Inflammation)

Rheumatologic

Rheumatoid Arthritis:

- Cervical Spine: Orthopedic surgical patients at higher risk for Atlantoaxial subluxation
- Posterior atlanto-odontoid interval (PADI) is the best predictor for neurological progression and recovery after surgical correction: PADI < 14mm - risk of neurological progression, PADI < 10mm risk of no recovery from paralysis
- RA carries equivalent MI risk as diabetes mellitus. Can assume RA is a CAD risk factor and proceed via ACC/AHA guidelines.
- Hold Methotrexate 1-2 weeks preop and 1-2 weeks after surgery (long enough to rule out postoperative wound infections or acute kidney injury)
- Hold Biologics 2-4 weeks prior to and after elective surgery
- Rituxan; avoid elective surgery for 4 weeks after last dose and at least 4 weeks before the next dose.

Provider Decision Support 12/2023 Dr Timothy Barwell

