Preoperative Medical Assessment (POMA) **2023-04-05**

Medicine is often consulted by surgical services to assess a patient's medical readiness for surgery as well as for guidance on perioperative management of their medical problems. This potentially involves a very large array of medical questions, depending on how complex the patient's medical conditions are and the type of surgery that is planned. We will divide the issues which must be addressed in a POMA by the major organ systems. Bear in mind that for all the discussion that follows, **one never "clears" a patient for a procedure, rather one estimates risks and makes recommendations for optimization. At the end of this section are listed recommended resources to inform your approach to writing a POMA (strongly recommended). Lastly, for neurointerventional procedures, see text on page 4 on relevant issues to consider.**

Your job is to facilitate the surgical procedure that your patient needs. Avoid unnecessary tests that would delay a procedure (ie make sure the tests/consults you recommend truly need to be done prior to the surgery). For example, an echo is not needed for most patients/surgeries; stress testing is seldom indicated. ***If you feel an echo or further cardiac evaluation or consultation may be indicated, discuss with Anesthesia (call Anesthesia Coordinator (24hr/7days) 718-396-4995)*. Note that if troponin is elevated, Anesthesia requests we call the Coordinator to discuss whether Echo is required.** If they agree an echo is indicated, you should expedite the study and report by contacting the echo fellow (4-5015 or page via AMION). Refer to AHA/ACC recs excerpted on page 5 for guidance on when an echo is indicated.

Do not delay the POMA until the day prior to OR! If Surgery consults us 3 days pre-op, do the POMA then! Note that **POMA's for surgeries planned for the OR within 24hr, including all hip fractures, are 'urgent' and should be expedited.** See the Hip Fracture POMA guide for details on the Hip Fracture POMA.

Please use the .**POMATR** as the template for your POMA note. (feel free to make suggestions for changes!)

Cardiac

Typically the major question that the Surgical service has for assessing operative readiness is the patient's cardiac status and their risk for decompensation or cardiac event perioperatively. **One essential task of the POMA is to estimate the patient's cardiac risk and to make recommendations for optimizing the patient for the planned procedure**. There are a number of methods of assessing cardiac risk. Perhaps the single most important tool to assess surgical risk is the ASA (American Society of Anesthesiologists) Physical Classification system. Use the following table as a rough guide. **Remember to factor in acute illness (eg MVA with polytrauma)!** More detailed examples from ASA are on the next page

Category	Preoperative Health Status	Comments, Examples (from ASA 2014-2020)
ASA I	Normal healthy patient	No organic, physiologic, or psychiatric disturbance; excludes the very young and very old; healthy with good exercise tolerance. No or minimal alcohol use, nonsmoking, normal BMI for age
ASA II	Patients with mild systemic disease	Mild diseases only, no substantial functional limitations; well-controlled hypertension or diabetes. Cigarette smoking; social drinking; obesity (BMI 31-39), CKD 1-2. Cirrhosis Child A. Well-controlled asthma, mild lung disease. Pregnancy without severe preeclampsia, not on insulin.
ASA III	Patients with severe systemic disease	Substantial functional limitation; one or more moderate to severe diseases. Examples: poorly controlled DM, HTN or COPD, morbid obesity (BM >40), OSA; EtOH use disorder; PPM, moderately reduced EF, MI/CVA/TIA/CAD/Stents >3 mo ago. CKD 3-4, or ESRD on regular HD; Cirrhosis Child B or acute hepatitis; Poorly controlled Asthma/COPD, OSA. Locally advanced or metastatic cancer

ASA IV	Patients with severe systemic disease that is a constant threat to life	MI/CVA/TIA/CAD/stents <3mo ago, ongoing cardiac ischemia, severe valvular dysftn. Severely reduced EF. Shock, sepsis, DIC, ARDS. ESRD not undergoing regular HD.
ASA V	Moribund patients not on expected to survive without operation	Not expected to survive > 24 hours without surgery. Examples include imminent risk of death; ruptured aortic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel with mult-organ dysftn or significant cardiac pathology
ASA VI	A declared brain-dead patient	pt being taken to OR for organ donation

Additional examples grouped by organ system are:

ASA III	ASA IV
Cardiac	
Poorly controlled HTN (BP>180/110)	
Stable CAD or asymptomatic after revascularization	Recent MI/Stents/ACS (<3mo)
Compensated moderate CHF/valvular disease	Decompensated CHF; severely reduced EF; severe valvular disease
PPM; Supraventricular tachycardias	AICD; Uncontrolled arrhythmia
Pulmonary	
Poorly controlled asthma/COPD	Severe active asthma/COPD (eg home O2; acute exacerbation)
OSA	OSA with Pulm HTN
Pulmonary fibrosis/sarcoid/tumor or metastasis not requiring home O2	Requiring home O2
Gastroenterology	
Compensated liver cirrhosis/failure (Childs B)	Decompensated liver cirrhosis/failure (Childs C)
Renal	
Compensated CKD/nonuremic ARF, ESRD on regular HD	uremic AKI or CKD, ESRD not getting regular HD, HRS
Heme/Onc	
Severe anemia (HCT<=25%), plt<50k, INR>=1.5, Thal Major	Plt<50k, INR >=1.5 with bleeding
Compensated heme malignancies	
Nonmetastatic solid tumor	Metastatic malignancies
Endocrine/metabolic	
Poorly controlled DM	DKA, HHS
Obesity BMI >=40	BMI>45
Symptomatic hypo or hyperthyroidism	Thyroid storm
	Symptomatic pheochromocytoma
Neurology	
Frequent seizures	Status epilepticus
	Increased ICP
Prior CVA >3mo	Acute stroke or current TIAs; Recent CVA/TIA (<3mo)
Compensated neurologic disease	Decompensated neurologic disease

Three calculators are endorsed in the ACC/AHA 2014 Guidelines for assessing Cardiac Perioperative risk: 1) RCRI, 2) Gupta Perioperative Risk (based on NSQIP data), and 3) ACS NSQIP Surgical Risk. All are reasonable choices to use in a POMA as they each have their strengths. The RCRI is the traditional choice, whereas the other two are based on the large NSQIP database and incorporate more modern surgical practices and outcomes. Of note, the ACS NSQIP calculator is only available online and requires one to provide the specific CPT code for the planned surgical procedure (use the built-in search feature) as well as detailed patient information, while the other two calculators are easier to use and are available as apps (eg **MDCalc**).

1. RCRI (**Revised Cardiac Risk Index**) uses the risk of the surgical procedure (high, intermediate, or low) and patient features (**Cr>2**, **CHF**, **DM on insulin**, **ischemic heart disease (MI, +stress, angina)**, **cerebrovascular disease (TIA/CVA)**) and patient features to divide patients into **4 risk class categories**: **"I" (no risk factors**), **"II" (1 risk factors) "III" (2 risk factors),** and **"IV"** (**3 or more risk factors)**. The **RCRI is the only calculator that has been externally validated**, but **tends to over-estimate cardiac risk in low risk patients and ambulatory procedures, while under-estimating cardiac risk for major vascular surgeries**. **It uses troponins instead of CPK-Mb so shows markedly higher NSTEMI rates then other tools**. The standard phrasing is to say "**As per RCRI ([n] risk factors), pt is at Class [I, II, III, IV] risk for major cardiac event or cardiac arrest within 30 days of the planned procedure**. **The patient is optimized with the following recommendations:**". (use **.POMATR** or MDCalc calculator)
2. Gupta is based on the type of surgical procedure and patient risk factors (age, functional status, ASA class, Cr) and gives an estimated risk for cardiac event, which is then stratified as "low cardiac risk" (if <1%) or "elevated cardiac risk" (if >1**%).** The Gupta calculator is based on 200,000 patients (snapshot of the surgical outcomes database NSQIP) and its strengths are this large database of recent patient data, but it has **only been validated retrospectively and underestimates MI's (because card enzymes only sent if MI suspected (hence under-diagnosed))**. **Standard phrasing is to say "as per Gupta, patient [is/is not] at elevated risk of MICA for the planned procedure"** (<1% =not elevated). Then, "**The patient is optimized with the following recommendations:**"
3. ACS NSQIP Surgical Risk calculator. Like Gupta, the ACS NSQIP calculator divides patients into "low" or "elevated" risk for MICA. It is based on a very large, ongoing survey of patient outcomes (**4.3 million surgeries** at last count) and is continually updated and calibrated. It has been **shown to perform well in patients with lower-risk procedures or those with a shorter length of stay**. It requires more detailed information about the patient as well as the specific CPT code for the procedure. Like Gupta, it underestimates MI's due to underdiagnosis of NSTEMI's. Standard phrasing is similar to that of the Gupta score.

The **2014 ACC/AHA guidelines also include specific recommendations such as:**
1) **when to order an echo pre-operatively (tldr: not often!)**
(mostly: known or suspected mod/severe valvular dz without echo past year; suspected but not dx'd HFrEF)
2) **which valvular abnormalities should be addressed** prior to non-urgent/emergent surgeries,
3) **how to manage AICD/PPM's during surgery**, and
4) **how to manage cardiac medications perioperatively** (eg **antiplatelet**, **antithrombotics**, statins, beta-blockers).

Key excerpts from ACC/AHA Guideline **are on pages 5-8.** Regarding the Perioperative Cardiac Ischemia Evaluation decision tree, **note that any ischemia evaluation must include careful consideration of what one would do with a "positive" test**, as cardiac revascularization would require delaying the surgery for at a minimum 1 month (BMS) and likely 3-6 months (DES). The key part in this decision tree is, **If patient + planned procedure indicate an elevated risk for cardiac event**, **AND patient is not known to have moderate exercise tolerance (>4 METS)**, **then carefully consider "would further testing affect decision-making or perioperative care"? If not** (eg if the risk to patient from delaying surgery for a prolonged period (eg 3-6 months after cardiac revascularization) is greater than that of simply proceeding with surgery with medical management), **then further testing is not recommended**. **Simply document the risk and medically optimize the patient**. **(NB *if the patient's presentation would not ordinarily call for urgent intervention (eg ACS or newly worsened angina with poor exercise tolerance), then studies have not shown benefit for preoperative revascularization over medical management)***.

Non-cardiac medical conditions and concerns

For details of perioperative management of other medical problems (eg Pulm, GI, Endo, Neuro, Hem, Renal, Rheum), you should refer to the relevant sections of the supporting documents listed below. Note that in addition to their known medical problems, you will need to screen for a few conditions that are important to consider in surgical patients.

- **You must confirm outpatient meds for all patients, and check these against a perioperative medication reference for guidance on perioperative management**. Med reconciliation is NOT to be simply deferred to the primary team. For each of the patient's medicines, consider how they should be managed during the perioperative period and make specific recommendations. General recommendations on meds can be found in the guides below, but **ESPECIALLY RECOMMEND WEBSITE BY KURT PFEIFER** which lists most medications, **though for newer medications or medication classes you will likely have to check PUBMED**.
- **Anticoagulation/DAPT**. Please refer to **H+H Perioperative Management of Anticoagulation** guideline. For additional notes, esp on pts with **recently dx'd DVT (consider IVC Filter)** and for Antiplatelet Management, please see section below on **Anticoagulation and Antiplatelet Therapy**.
- **Anemia** is a common perioperative issue. **NB: The Frankfort Consensus Guidelines (2019)** (see link below) **recommend transfuse to Hb>8 for orthopedic surgeries (and Hb>7.5 for CABG)**
- **All patients should be screened for OSA** (**STOPBANG**, available on **MDCalc**), history of idiosyncratic reactions to anesthesia, and bleeding problems**. If OSA is suspected but not previously diagnosed (eg suspicious history or STOPBANG >=3 AND elevated HCO3/pCO2 retention), specific recommendations and language to adapt are included at the end of this document (page 9).**

Neurointervention Procedures

- These procedures (eg embolizations) are often performed under General Anesthesia. Moreover, the patient must be supine for up to 90 minutes, and typically receives up to 2 liters of IVF. Consider cardiopulmonary risks of anesthesia, volume status, cardiac and renal function as well as eg NPO status effect on DM.

Reference materials for Preoperative Evaluation (indicate particularly useful references)**

- **Preoperative Evaluation for Noncardiac Surgery** (Annals Internal Medicine "In The Clinic", 2015) **(great place to start)**
- ****"GUIDE TO PERIOPERATIVE EVALUATION"** (KURT PFEIFER, MCW) (**OUTSTANDING RESOURCE!**)
  (organ-based review of perioperative assessment and management; easily-searched database with medication management recommendations)
  - **strongly recommend you download this site to your phone as an "app"** for quick, ready reference
- ****MKSAP 19 Perioperative Medicine section** (MKSAP 19 Perioperative Medicine) is succinct and great and is also "on the boards", so read it!
- ****Perioperative Medication Management Reference (Gina Lee)** **(comprehensive, last updated 2016)**
  - Montefiore Perioperative Medicine is also useful, including links to relevant UpToDate pages
- ****UpToDate sections** on Preoperative and Perioperative Medicine
- **2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management** of Patients undergoing Noncardiac Surgery: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines.
- Other literature as contained in Google Drive for POMA Guide and Resources

Key Excerpts from ACC/AHA 2014 Guidelines on Preoperative Evaluation

When to Consider Echo Pre-op to assess Valvular Function

Class I *1. It is* ***recommended*** *that patients with* ***clinically suspected moderate or greater degrees of valvular stenosis or regurgitation*** *undergo preoperative echocardiography* ***if there has been EITHER 1) no prior echocardiography within 1 year OR 2) a significant change in clinical status or physical examination since last evaluation*** *(60). (Level of Evidence: C) 2. For adults who meet standard indications for valvular intervention (replacement and repair) on the basis of symptoms and severity, valvular intervention before elective noncardiac surgery is effective in reducing perioperative risk (15). (Level of Evidence: C)*

When to Consider Echo Pre-op to assess Left Ventricular Function

Class IIa 1. *It is* ***reasonable*** *for patients with* ***dyspnea of unknown origin*** *to undergo preoperative evaluation of left ventricular (LV) function. (Level of Evidence: C) 2. It is* ***reasonable*** *for patients with heart failure* ***(HF) with worsening dyspnea or other change in clinical status*** *to undergo preoperative evaluation of LV function. (Level of Evidence: C)*

Class IIb 1. *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.*** *(Level of Evidence: C)*

Class III: No Benefit 1. Routine preoperative evaluation of LV function is not recommended (69–71). (Level of Evidence: B)

Table 3. Summary of Recommendations for Supplemental Preoperative Evaluation

Recommendations	COR	LOE	References
The 12-lead ECG			
Preoperative resting 12-lead ECG is reasonable for patients with known coronary heart disease or other significant structural heart disease, except for low-risk surgery	IIa	B	64–66
Preoperative resting 12-lead ECG may be considered for asymptomatic patients, except for low-risk surgery	IIb	B	59, 65–67
Routine preoperative resting 12-lead ECG is not useful for asymptomatic patients undergoing low-risk surgical procedures	III: No Benefit	B	36, 68
Assessment of LV function			
It is reasonable for patients with dyspnea of unknown origin to undergo preoperative evaluation of LV function	IIa	C	N/A
It is reasonable for patients with HF with worsening dyspnea or other change in clinical status to undergo preoperative evaluation of LV function	IIa	C	N/A
Reassessment of LV function in clinically stable patients may be considered	IIb	C	N/A
Routine preoperative evaluation of LV function is not recommended	III: No Benefit	B	69–71
Exercise stress testing			
For patients with elevated risk and excellent functional capacity, it is reasonable to forgo further exercise testing and proceed to surgery	IIa	B	72–76
For patients with elevated risk and unknown functional capacity it may be reasonable to perform exercise testing to assess for functional capacity if it will change management	IIb	B	75–77
Cardiopulmonary exercise testing may be considered for patients undergoing elevated risk procedures	IIb	B	78–86
For patients with elevated risk and moderate to good functional capacity, it may be reasonable to forgo further exercise testing and proceed to surgery	IIb	B	72–74
For patients with elevated risk and poor or unknown functional capacity it may be reasonable to perform exercise testing with cardiac imaging to assess for myocardial ischemia	IIb	C	N/A
Routine screening with noninvasive stress testing is not useful for low-risk noncardiac surgery	III: No Benefit	B	87, 88
Noninvasive pharmacological stress testing before noncardiac surgery			
It is reasonable for patients at elevated risk for noncardiac surgery with poor functional capacity to undergo either DSE or MPI if it will change management	IIa	B	89–93
Routine screening with noninvasive stress testing is not useful for low-risk noncardiac surgery	III: No Benefit	B	87, 88
Preoperative coronary angiography			
Routine preoperative coronary angiography is not recommended	III: No Benefit	C	N/A

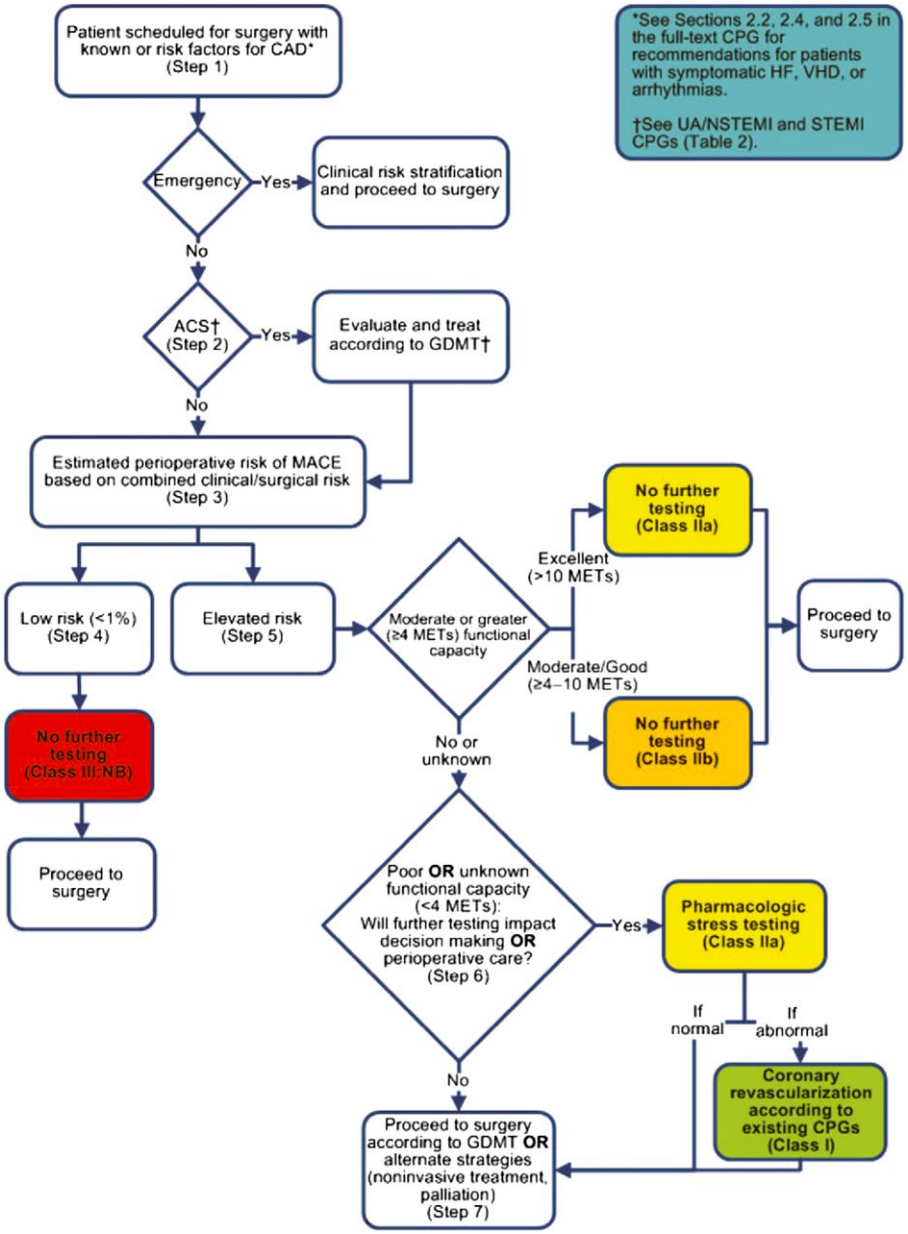
COR indicates Class of Recommendation; DSE, dobutamine stress echocardiogram; ECG, electrocardiogram; HF, heart failure; LOE, Level of Evidence; LV, left ventricular; MPI, myocardial perfusion imaging; and N/A, not applicable.

Table 4. Summary of Recommendations for Perioperative Therapy

Recommendations	COR	LOE	References
Coronary revascularization before noncardiac surgery			
Revascularization before noncardiac surgery is recommended when indicated by existing CPGs	I	C	95, 96
Coronary revascularization is not recommended before noncardiac surgery exclusively to reduce perioperative cardiac events	III: No Benefit	B	97
Timing of elective noncardiac surgery in patients with previous PCI			
Noncardiac surgery should be delayed after PCI	I	C: 14 d after balloon angioplasty	N/A
		B: 30 d after BMS implantation	99–101
Noncardiac surgery should optimally be delayed 365 d after DES implantation	I	B	102–105
A consensus decision as to the relative risks of discontinuation or continuation of antiplatelet therapy can be useful	IIa	C	N/A
Elective noncardiac surgery after DES implantation may be considered after 180 d	IIb*	B	102, 106
Elective noncardiac surgery should not be performed in patients in whom DAPT will need to be discontinued perioperatively within 30 d after BMS implantation or within 12 mo after DES implantation	III: Harm	B	99–105, 107
Elective noncardiac surgery should not be performed within 14 d of balloon angioplasty in patients in whom aspirin will need to be discontinued perioperatively	III: Harm	C	N/A
Perioperative beta-blocker therapy			
Continue beta blockers in patients who are on beta blockers chronically	I	B SR†	111–117
Guide management of beta blockers after surgery by clinical circumstances	IIa	B SR†	110,117,118
In patients with intermediate- or high-risk preoperative tests, it may be reasonable to begin beta blockers	IIb	C SR†	119
In patients with ≥3 RCRI factors, it may be reasonable to begin beta blockers before surgery	IIb	B SR†	117
Initiating beta blockers in the perioperative setting as an approach to reducing perioperative risk is of uncertain benefit in those with a long-term indication but no other RCRI risk factors	IIb	B SR†	111, 117, 120
It may be reasonable to begin perioperative beta blockers long enough in advance to assess safety and tolerability, preferably >1 d before surgery	IIb	B SR†	110, 121–123
Beta-blocker therapy should not be started on the d of surgery	III: Harm	B SR†	110
Perioperative statin therapy			
Continue statins in patients currently taking statins	I	B	131–134
Perioperative initiation of statin use is reasonable in patients undergoing vascular surgery	IIa	B	135
Perioperative initiation of statins may be considered in patients with a clinical risk factor who are undergoing elevated-risk procedures	IIb	C	N/A
Alpha-2 agonists			
Alpha-2 agonists are not recommended for prevention of cardiac events	III: No Benefit	B	136–140
ACE inhibitors			
Continuation of ACE inhibitors or ARBs is reasonable perioperatively	IIa	B	141, 142
If ACE inhibitors or ARBs are held before surgery, it is reasonable to restart as soon as clinically feasible postoperatively	IIa	C	N/A
Antiplatelet agents			
Continue DAPT in patients undergoing urgent noncardiac surgery during the first 4 to 6 wk after BMS or DES implantation, unless the risk of bleeding outweighs the benefit of stent thrombosis prevention	I	C	N/A
In patients with stents undergoing surgery that requires discontinuation of $P2Y_{12}$ inhibitors, continue aspirin and restart the $P2Y_{12}$ platelet receptor–inhibitor as soon as possible after surgery	I	C	N/A

(*Continued*)

Perioperative Cardiac Ischemia Evaluation (ACC/AHA 2014)



Step 1: **In patients scheduled for surgery with risk factors for or known CAD**, determine the urgency of surgery. If an emergency, then determine the clinical risk factors that may influence perioperative management and proceed to surgery with appropriate monitoring and management strategies. (**For patients with symptomatic HF, valvular disease, or arrhythmias, see the full text of the guideline for information on evaluation and management.**) **Step 2**: **If the surgery is urgent or elective, determine if** the patient has **ACS. If yes, then refer patient for cardiology evaluation and management**. **Step 3**: If the patient has risk factors for stable CAD, then **estimate the perioperative risk of MACE** on the basis of the combined clinical/surgical risk. This estimate can use the American College of Surgeons **NSQIP risk calculator** (http://www.riskcalculator.facs.org) **or incorporate the RCRI with an estimation of surgical risk**. For example, a patient undergoing very low-risk surgery (eg, ophthalmologic surgery), even with multiple risk factors, would have a low risk of MACE, whereas a patient undergoing major vascular surgery with few risk factors would have an elevated risk of MACE. **Step 4:** If the patient has a **low risk of MACE (<1%), then no further testing** is needed. **Step 5:** If the patient is at **elevated risk of MACE, then determine functional capacity** with an objective measure or scale such as the DASI. If the patient has moderate, good, or excellent functional capacity (≥4 METs), then proceed to surgery without further evaluation. **Step 6:** If the patient has **poor (<4 METs) or unknown functional capacity, then the clinician should consult with the patient and perioperative team to determine whether further testing will impact patient decision making** (eg, decision to perform original surgery or willingness to undergo CABG or PCI) or perioperative care. If yes, then pharmacological stress testing is appropriate. In those patients with unknown functional capacity, exercise stress testing *may* be reasonable. If the stress test is abnormal, consider angiography and revascularization. The patient can then proceed to surgery with GDMT or consider alternative strategies, such as noninvasive treatment of the indication for surgery (eg, radiation therapy for cancer) or palliation.

For POMA's for patients suspected to have OSA (and no time to clarify with sleep study):

The following language has been suggested by Dr Astua (Chief of Pulmonary). The following text should be adapted to individual patients. Note that STOPBANG is sensitive but not specific for OSA

Preop Eval Surgery Clause for **High Risk Patient** scheduled **for higher risk surgery** with no prior study

1. The patient should discuss diagnosis with all health care providers prior to any surgery and sedation. The patient has a high likelihood of having OSA as seen by high STOP BANG score, elevated BMI (>40), clinical evidence and/or elevated bicarbonate in a patient undergoing higher risk surgery.
2. Ideally a sleep study should be performed and treatment should commence prior to surgery
3. If surgery cannot wait for diagnosis and treatment, judicious use of sedation and pain control during and after surgery and when possible use non opioid medications as alternatives are advised. **Extubation** should take place **when patient is fully awake and in the semi-upright, lateral or prone positions** (not supine). Patient should be observed in the recovery area, undisturbed, for any arrhythmia, desaturation, snoring or apnea while on empiric CPAP 10 cm of water and if any of these noted may increase CPAP by 2 cm of water until these are abolished. If moderate sedation is used, ventilation should be continuously monitored by capnography or another automated method if possible because of the increased risk of undetected airway obstruction. If possible, patients at increased perioperative risk from OSA should be placed in non-supine positions throughout the recovery process.

Preop Eval Surgery Clause for **High Risk Patient** scheduled for **lower risk surgery** with no prior study

1. The patient should discuss diagnosis with all health care providers prior to any surgery and sedation. The patient is likely to have OSA as seen by STOP BANG score, elevated BMI, and clinical/physical exam obtained during consultation. Patient evaluated for a lower risk surgery procedure.
2. Ideally the study and treatment should commence prior to surgery, however, may schedule for surgery with the following to be considered:
    a. judicious use of sedation and pain control during and after surgery and when possible use non opioid medications as alternatives are advised. **Extubation** should take place **when patient is fully awake and in semi-upright, lateral or prone position** (not supine). Patient should be observed in the recovery area, undisturbed, for any arrhythmia, desaturation, snoring or apnea and may start on empiric estimated CPAP 10 cm of water and if any of these noted as well as increase CPAP by 2 cm of water until these are abolished. If moderate sedation is used, ventilation should be continuously monitored by capnography or another automated method if possible because of the increased risk of undetected airway obstruction in these patients.
    b. if possible, patients at increased perioperative risk from OSA should be placed in non-supine positions throughout the recovery process.
3. Patient should be scheduled for sleep study and follow up. If needed, PAP therapy should be started.
4. May schedule surgery with the above to follow, however, ultimately the decision is a joint one with the surgeon, anesthesiologist, patient and caregiver.

Anticoagulation and Antiplatelet Perioperative Management:

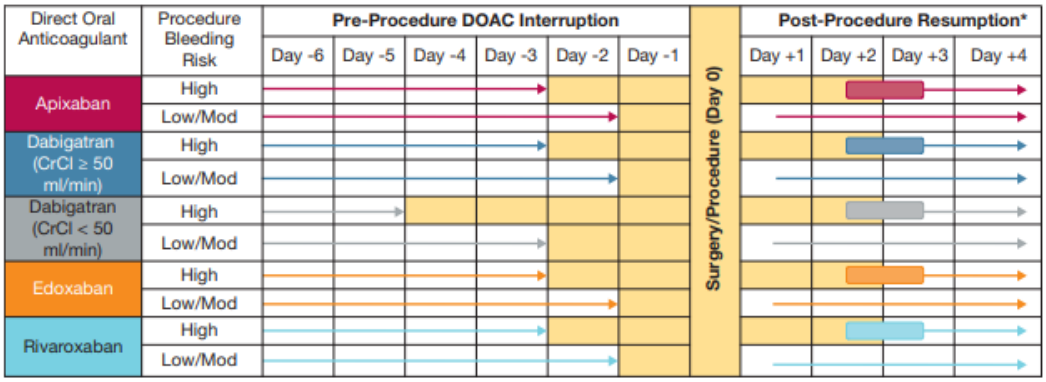
1) See **Antiplatelet Perioperative Management** section below for recommendations on Antiplatelet meds.
2) See **H+H Perioperative Management of Anticoagulation** guideline for Anticoagulation guidance.
3) **for VTE (DVT/PE)**, the thrombosis risk varies depending on whether the VTE is acute and the etiology of the patient's thrombophilia. ****For pts whose VTE happened <1 mo ago AND whose therapeutic AC cannot be restarted for > 12hr post-surgery**, we recommend placing a removable IVC filter while the pt is off AC, then removing the filter when AC is resumed (IR aware and agrees with this strategy).**
4) **For Prosthetic valves**, **H+H Perioperative Management of Anticoagulation** and **Uptodate section on bridging** follow ACC guidelines closely. Recommend that you review closely for good discussion of when and how to Bridge by assessing and adjudicating competing risks of bleeding vs thrombosis.
5) **For Afib**, **bridging is not generally recommended in "non-valvular" Afib pts with CHADSVASC<7**, since, per the BRIDGE trial, the risk for thrombosis is *not* reduced with bridging, whereas the risk of bleeding *is* higher with bridging. **Note that Afib in Rheumatic Heart Disease (with moderate or severe MS) should be bridged** . See table below for ACCP 2022 risk assessment.
6) **For Bridging pts on warfarin**, stop warfarin 4 days prior to procedure, goal INR <1.5 on day of surgery
    a) once INR subtherapeutic, use UFH drip or LMWH pre and post-op
    b) pre-op: if UFH drip, stop 4-6hr pre-procedure; if LMWH, give last dose 24hr prior to procedure
    c) post-op: bridging with UFH or LMWH individualized based on bleeding risk/thrombosis risk
    d) restart AC post-procedure **depending on risk of bleeding and adequacy of surgical hemostasis (discuss with surgeon/interventionalist)**
    e) minor surgical procedure OR if good hemostasis achieved: restart AC at 24hr (UFH or LMWH)
    f) major surgery or high bleeding risk: resume UFH drip or LMWH at 48-72hr, only if hemostasis is secure (**discuss with surgeon/interventionalist)**
    g) restart warfarin as soon as possible after procedure (eg at 12-24hr) when adequate hemostasis. Once LMWH or UFH started, continue until INR at goal 2 consecutive days

Useful discussion of estimating thrombosis and procedural bleeding risk is found in Uptodate

Excellent discussions in ACCP 2022, UptoDate, and UCSF Hospitalist Handbook are good resources.
From ACCP 2022 executive summary (11pg) and complete guideline (28pg)

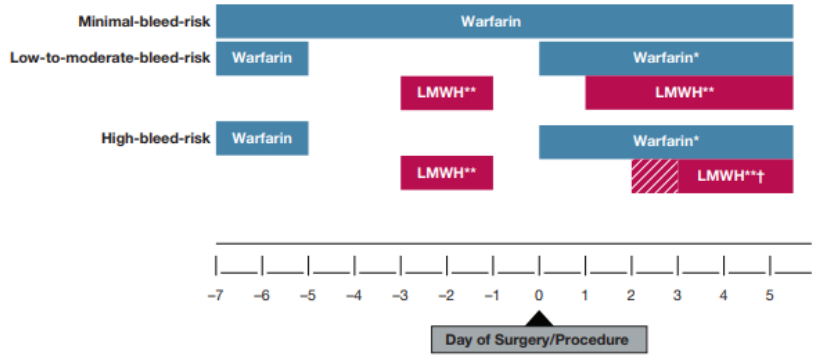
Thrombosis Risk Categories (from ACCP 2022).
For low/moderate risk: no bridging recommneded.
For High Risk thrombosis: Bridge with LMWH (last dose given 24hr prior at ½ total daily dose)

Risk Category	Mechanical Heart Valve	Atrial Fibrillation	VTE
High (> 10%/y risk of ATE or > 10%/mo risk of VTE)	Mitral valve with major risk factors for stroke[b] Caged ball or tilting-disc valve in mitral/aortic position Recent (< 3 mo) stroke or TIA or other high-risk stroke situations[c]	CHA_2DS_2VASc score of ≥ 7 or $CHADS_2$ score of 5 or 6 Recent (< 3 mo) stroke or TIA Rheumatic valvular heart disease	Recent (< 3 mo and especially 1 mo) VTE Severe thrombophilia (deficiency of protein C, protein S or antithrombin; homozygous factor V Leiden or prothrombin gene G20210A mutation or double heterozygous for each mutation, multiple thrombophilias) Antiphospholipid antibodies Active cancer associated with high VTE risk[a]
Moderate (4%-10%/y risk of ATE or 4%-10%/mo risk of VTE)	Bileaflet AVR *with* major risk factors for stroke[b]	CHA_2DS_2VASc score of 5 or 6 or $CHADS_2$ score of 3 or 4	VTE within past 3-12 mo Recurrent VTE Non-severe thrombophilia (heterozygous factor V Leiden or prothrombin gene G20210A mutation) Active cancer or recent history of cancer[c]
Low (< 4%/y risk of ATE or < 2%/mo risk of VTE)	Bileaflet AVR *without* major risk factors for stroke[b]	CHA_2DS_2VASc score of 1-4 or $CHADS_2$ score of 0-2 (and no prior stroke or TIA)	VTE > 12 mo ago



No DOAC administered that day

*DOAC can be resumed ~24 hours after low/moderate-bleed-risk procedures, and 48-72 hours after high-bleed-risk procedures. In selected patients at high risk for VTE, low-dose anticoagulants (i.e., enoxaparin, 40 mg daily or dalteparin, 5,000 IU daily) can be given for the first 48-72 hours post-procedure.



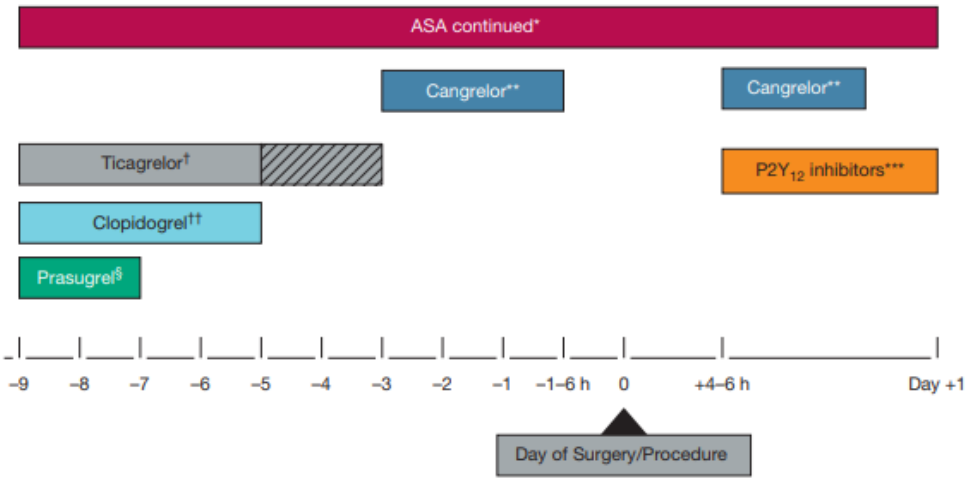
Legend
*Warfarin can be resumed on the evening of procedure (D0) for most patients, or the day after procedure (i.e., D1) at the patient's usual maintenance dose.
**Bridging suggested for high thrombotic risk populations with full-dose, subcutaneous LMWH (e.g., enoxaparin, 1 mg/kg bid or 1.5 mg/kg daily or dalteparin, 100 IU/kg bid or 200 IU/kg daily), with the last dose given the AM of the day prior to the procedure (i.e., D-1) at half the total daily dose.
†Low-dose LMWH (e.g., enoxaparin, 40 mg daily or dalteparin 5,000 IU daily) can be used for VTE prophylaxis for first 24-72 hours post-procedure, with full dose LMWH resumed 2-3 days post-procedure.

TABLE 2] Suggested Risk Stratification for Procedural Bleed Risk Based on ISTH Guidance Statements[B]

High-bleed-risk surgery/procedure[a] (30-d risk of major bleed ≥ 2%)	Major surgery with extensive tissue injury Cancer surgery, especially solid tumor resection (lung, esophagus, gastric, colon, hepatobiliary, pancreatic) Major orthopedic surgery, including shoulder replacement surgery Reconstructive plastic surgery Major thoracic surgery Urologic or GI surgery, especially anastomosis surgery Transurethral prostate resection, bladder resection, or tumor ablation Nephrectomy, kidney biopsy Colonic polyp resection Bowel resection Percutaneous endoscopic gastrostomy placement, endoscopic retrograde cholangiopancreatography Surgery in highly vascular organs (kidneys, liver, spleen) Cardiac, intracranial, or spinal surgery Any major operation (procedure duration > 45 min) Neuraxial anesthesia[b] Epidural injections
Low-to-moderate-bleed-risk surgery/procedure[c] (30-d risk of major bleed 0%-2%)	Arthroscopy Cutaneous/lymph node biopsies Foot/hand surgery Coronary angiography[d] GI endoscopy ± biopsy Colonoscopy ± biopsy Abdominal hysterectomy Laparoscopic cholecystectomy Abdominal hernia repair Hemorrhoidal surgery Bronchoscopy ± biopsy
Minimal-bleed-risk surgery/procedure[e] (30-d risk of major bleed approximately 0%)	Minor dermatologic procedures (excision of basal and squamous cell skin cancers, actinic keratoses, and premalignant or cancerous skin nevi) Ophthalmologic (cataract) procedures Minor dental procedures (dental extractions, restorations, prosthetics, endodontics), dental cleanings, fillings Pacemaker or cardioverter-defibrillator device implantation

ISTH = International Society on Thrombosis and Haemostasis.
[a]Minimal to no residual anticoagulant effect at time of procedure (ie, four to five drug half-life interruptions pre-procedure).
[b]Includes spinal and epidural anesthesia or any other neuraxial (eg, pain management) intervention; consider not only absolute risk for major bleeding but potentially devastating consequences of epidural bleeding and associated lower limb paralysis.
[c]Some residual anticoagulant effect allowed (ie, two to three drug half-life interruptions pre-procedure).
[d]Radial approach may be considered minimal-bleed-risk compared with femoral approach.
[e]Procedure can be safely done under full-dose anticoagulation (may consider holding DOAC dose day of procedure to avoid peak anticoagulant effects).

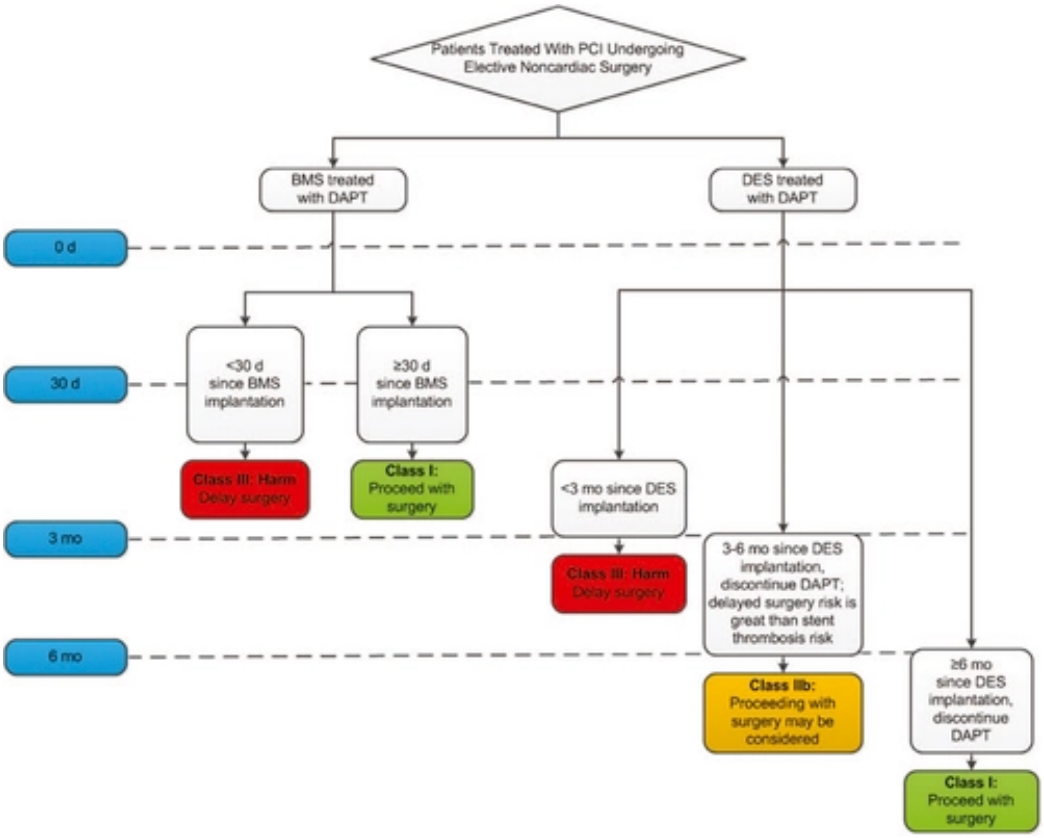
Antiplatelet Perioperative Management



Legend:
*Based on surgery/procedure bleed risk assessment.
**Routine use not suggested. If used, initiate within 72 hours from $P2Y_{12}$ inhibitor discontinuation at dose of 0.75 mg/kg/min; resume within 6 hours post-procedure for minimum of 48 hours and maximum of 7 days total. Very low quality data for antiplatelet bridging with glycoprotein IIb/IIIa inhibitors (e.g., eptifibatide, tirofiban).
***$P2Y_{12}$ inhibitors can be resumed within 24 hours post-procedure at a maintenance dose.
†For ticagrelor, 3-5 day interruption
††For clopidogrel, 5 day interruption
§For prasugrel, 7-10 day interruption.

Figure 3 – *Perioperative management of antiplatelet drugs. ASA = aspirin.*

Per [ACC/AHA Update to Guideline for Duration of Antiplatelet Therapy (2016)]


Patients Treated With PCI Undergoing Elective Noncardiac Surgery
BMS treated with DAPT
DES treated with DAPT
0 d
30 d
3 mo
6 mo
<30 d since BMS implantation
≥30 d since BMS implantation
Class III: Harm Delay surgery
Class I: Proceed with surgery
<3 mo since DES implantation
Class III: Harm Delay surgery
3-6 mo since DES implantation, discontinue DAPT; delayed surgery risk is great than stent thrombosis risk
Class IIb: Proceeding with surgery may be considered
≥6 mo since DES implantation, discontinue DAPT
Class I: Proceed with surgery

Recommendations for Perioperative Management in Patients Treated With PCI and DAPT

I	Elective noncardiac surgery should be delayed 30 days after BMS implantation and optimally 6 months after DES implantation (101–103,143–146).
I	In patients treated with DAPT after coronary stent implantation who must undergo surgical procedures that mandate the discontinuation of $P2Y_{12}$ inhibitor therapy, it is recommended that aspirin be continued if possible and the $P2Y_{12}$ platelet receptor inhibitor be restarted as soon as possible after surgery.
IIa	When noncardiac surgery is required in patients currently taking a $P2Y_{12}$ inhibitor, a consensus decision among treating clinicians as to the relative risks of surgery and discontinuation or continuation of antiplatelet therapy can be useful.
IIb	Elective noncardiac surgery after DES implantation in patients for whom $P2Y_{12}$ inhibitor therapy will need to be discontinued may be considered after 3 months if the risk of further delay of surgery is greater than the expected risks of stent thrombosis.
III: Harm	Elective noncardiac surgery should not be performed within 30 days after BMS implantation or within 3 months after DES implantation in patients in whom DAPT will need to be discontinued perioperatively (101–103,143–146).