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SOCIETAL STATEMENT

2024 Perioperative Cardiovascular Management for Noncardiac Surgery Guideline-at-a-Glance

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INTRODUCTION

The 2024 AHA/ACC/ACS/ASNC/HRS/SCA/SCCT/SCMR/SVM Guideline for Perioperative Cardiovascular Management for Noncardiac Surgery (AHA/ACC/Multisociety Perioperative Guideline) provides the latest guidance for clinicians on the cardiovascular management of patients undergoing noncardiac surgery (NCS).[1] The guideline contains updated, evidence-based recommendations that build on those from the 2014 Perioperative Guideline.[2] This Guideline-at-a-Glance highlights practice-changing recommendations from the guideline to accelerate adoption.

ACC guideline dissemination is an organization-wide effort facilitated by the Solution Set Oversight Committee to ensure the integration of guideline content throughout ACC's clinical policy, education, registry, membership, and advocacy efforts. For each guideline, an ACC Guideline Dissemination Workgroup is created to influence dissemination strategy and to develop tools to facilitate the implementation of key changes in practice. These tools include the *JACC* **Central Illustration**, as well as tables highlighting updates in the AHA/ACC/Multisociety Perioperative Guideline and comparisons to the 2022 European Society of Cardiology (ESC) Guidelines on Cardiovascular Assessment and Management of Patients Undergoing Noncardiac Surgery.[3]

TOP TAKE-HOME MESSAGES

The following Top Take-Home Messages are taken directly from the AHA/ACC/Multisociety Perioperative Guideline. The ACC Perioperative Guideline Dissemination Workgroup selected 3 of the Top Take-Home Messages (in bold) as key themes for this Guideline-at-a-Glance as they represent the most impactful recommendation changes compared to previous guidelines and address known gaps in clinical practice.

1. **A stepwise approach to perioperative cardiac assessment assists clinicians in determining when surgery should proceed or when a pause for further evaluation is warranted.**
2. Cardiovascular screening and treatment of patients undergoing NCS should adhere to the same indications as nonsurgical patients, carefully timed to avoid delays in surgery and chosen in ways to avoid overscreening and overtreatment.
3. **Stress testing should be performed judiciously in patients undergoing NCS, especially those at lower risk, and only in patients in whom testing would be appropriate independent of planned surgery.**
4. Team-based care should be emphasized when managing patients with complex anatomy or unstable cardiovascular disease.
5. **New therapies for management of diabetes, heart failure, and obesity have significant perioperative implications. Sodium-glucose cotransporter 2 inhibitors (SGLT2i) should be discontinued 3 to 4 days before surgery to minimize the risk of perioperative ketoacidosis associated with their use.**
6. Myocardial injury after noncardiac surgery (MINS) is a newly identified disease process that should not be ignored because it portends real consequences for affected patients.

*On behalf of the ACC Solution Set Oversight Committee.

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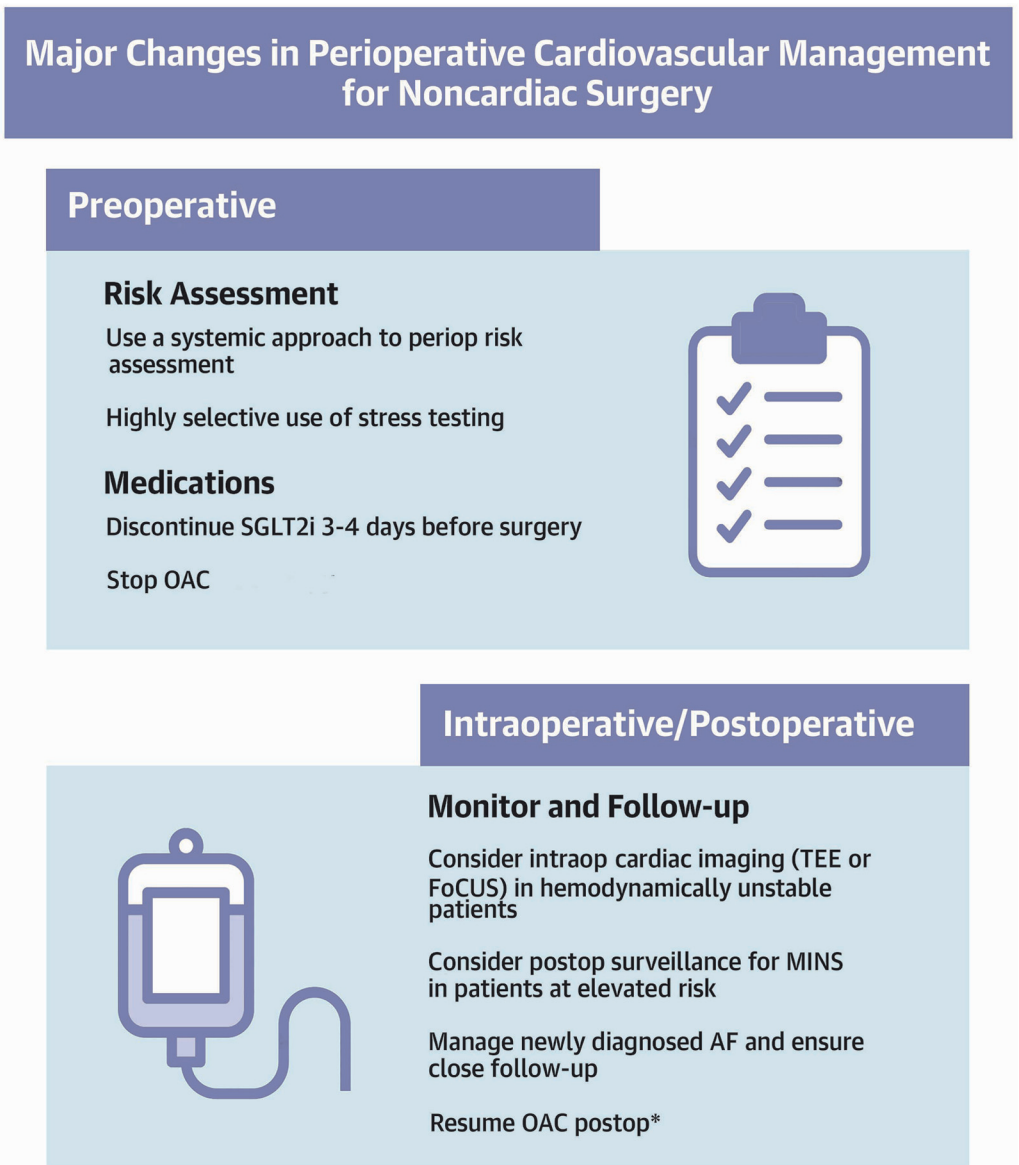
7. Patients with newly diagnosed atrial fibrillation (AF) identified during or after NCS have an increased risk of stroke. These patients should be followed closely after surgery to treat reversible causes of arrhythmia and to assess the need for rhythm control and long-term anticoagulation.
8. Perioperative bridging of oral anticoagulant therapy should be used selectively only in those patients at highest risk for thrombotic complications and is not recommended in the majority of cases.
9. In patients with unexplained hemodynamic instability and when clinical expertise is available, emergency focused cardiac ultrasound can be used for perioperative evaluation; however, focused cardiac ultrasound should not replace comprehensive transthoracic echocardiography.

CENTRAL ILLUSTRATION 2024 Perioperative Cardiovascular Management for Noncardiac Surgery Guideline-at-a-Glance



Bhave SD, et al. JACC. 2024;10.1016/j.jacc.2024.08.018.

*For warfarin, pre- and postop bridging only if high thrombotic risk. AF = atrial fibrillation; FoCUS = focused cardiac ultrasound; MINS = myocardial injury after noncardiac surgery; OAC = oral anticoagulant; periop = perioperative; postop = postoperative; SGLT2i = sodium-glucose cotransporter-2 inhibitors; TEE = transesophageal echocardiography.

TABLE 1 Select Differences Between the 2014 and the 2024 AHA/ACC/Multisociety Perioperative Guidelines

	2014[2]		2024[1]	
	COR*	Old Recommendations	COR*	New Recommendations
Stress testing (Top Take-Home Message 3)	2a	For patients with elevated risk and excellent (>10 METs) functional capacity, it is reasonable to forgo further exercise testing with cardiac imaging and proceed to surgery.	2b	For patients undergoing elevated-risk NCS with poor or unknown functional capacity and elevated risk for perioperative cardiovascular events based on a validated risk tool, stress testing may be considered to evaluate for inducible myocardial ischemia.
	2b	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.		
	2b	For patients with elevated risk and moderate to good (≥4 METs to 10 METs) functional capacity, it may be reasonable to forgo further exercise testing with cardiac imaging and proceed to surgery.		
	2b	For patients with elevated risk and poor (<4 METs) or unknown functional capacity, it may be reasonable to perform exercise testing with cardiac imaging to assess for myocardial ischemia if it will change management.		
	3: No Benefit	Routine screening with noninvasive stress testing is not useful for patients at low risk for NCS.	3: No Benefit	In patients who are at low risk for perioperative cardiovascular events, have adequate† functional capacity with stable symptoms, or who are undergoing low-risk procedures, routine stress testing before NCS is not recommended due to lack of benefit.
SGLT2i (Top Take-Home Message 5)	No corresponding guideline recommendation.		1	In patients with heart failure undergoing elective NCS, SGLT2i should be withheld for 3 to 4 days‡ before surgery when feasible to reduce the risk of perioperative metabolic acidosis.
			1	In patients scheduled for NCS, SGLT2i should be discontinued 3 to 4 days‡ days before surgery to reduce the risk of perioperative metabolic acidosis.
Myocardial injury after noncardiac surgery (Top Take-Home Message 6)	2b	The usefulness of postoperative screening with troponin levels in patients at high risk for perioperative MI, but without signs or symptoms suggestive of myocardial ischemia or MI, is uncertain in the absence of established risks and benefits of a defined management strategy.	2b	In patients with known CVD, with symptoms of CVD, or age ≥65 years with cardiovascular risk factors undergoing elevated-risk NCS, it may be reasonable to measure cTn at 24 and 48 hours after surgery to identify myocardial injury.
	3: No Benefit	Routine postoperative screening with troponin levels in unselected patients without signs or symptoms suggestive of myocardial ischemia or MI is not useful for guiding perioperative management.	3: No Benefit	In patients undergoing low-risk NCS, routine postoperative screening with cTn levels is not indicated without signs or symptoms suggestive of myocardial ischemia or MI.
	No corresponding guideline recommendation.		2a	In patients who develop MINS, especially in those not previously known to have excess cardiovascular risk, outpatient follow-up is reasonable for optimization of cardiovascular risk factors.
	No corresponding guideline recommendation.		2b	In patients who develop MINS, antithrombotic therapy may be considered to reduce thromboembolic events.
Atrial fibrillation (Top Take-Home Message 7)	No corresponding guideline recommendation.		2a	In patients with rapid AF identified in the setting of NCS, it is reasonable to treat potential underlying triggers contributing to AF and rapid ventricular response (eg, sepsis, anemia, pain).
			2a	In patients with new-onset AF identified in the setting of NCS, initiation of postoperative anticoagulation therapy can be beneficial after considering the competing risks associated with thromboembolism and perioperative bleeding.
			1	In patients with new-onset AF identified in the setting of NCS, outpatient follow-up for thromboembolic risk stratification and AF surveillance are recommended given a high risk of AF recurrence.

*Colors in this table align with the classification system found in Table 3, "Applying American College of Cardiology/American Heart Association Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care," in the AHA/ACC/Multisociety Perioperative Guideline.[1]
†Poor functional capacity is considered <4 METs or a DASI score of ≤34.
‡Canagliflozin, dapagliflozin, and empagliflozin should be stopped ≥3 days and ertugliflozin ≥4 days before scheduled surgery.

ACC = American College of Cardiology; AF = atrial fibrillation; AHA = American Heart Association; COR = Class of Recommendation; cTn = cardiac troponin; CVD = cardiovascular disease; DASI = Duke Activity Status Index; MET = metabolic equivalent; MI = myocardial infarction; MINS = myocardial injury after noncardiac surgery; NCS = noncardiac surgery; SGLT2i = sodium-glucose cotransporter-2 inhibitors.

TABLE 2 Select Comparison of 2024 AHA/ACC/Multisociety Perioperative Guideline and 2022 ESC Noncardiac Surgery Guidelines

	ESC Guideline[3]		AHA/ACC/Multisociety Guideline[1]	
	COR*	ESC recommendation	COR*	AHA/ACC/Multisociety recommendation
Stress testing (Top Take-Home Message 3)	1	Stress imaging is recommended before high-risk elective NCS in patients with poor functional capacity and high likelihood of CAD or high clinical risk.	2b	For patients undergoing elevated-risk NCS with poor or unknown functional capacity and elevated risk for perioperative cardiovascular events based on a validated risk tool, stress testing may be considered to evaluate for inducible myocardial ischemia.
	2a	Stress imaging should be considered before high-risk NCS in asymptomatic patients with poor functional capacity and previous PCI or CABG.		
	2b	Stress imaging may be considered before intermediate-risk NCS when ischemia is of concern in patients with clinical risk factors and poor functional capacity.		
	3	Stress imaging is not recommended routinely before NCS.	3: No Benefit	In patients who are at low risk for perioperative cardiovascular events, have adequate† functional capacity with stable symptoms, or who are undergoing low-risk procedures, routine stress testing before NCS is not recommended due to lack of benefit.
SGLT2i (Top Take-Home Message 5)	2a	It should be considered to interrupt SGLT2i therapy for at least 3 days before intermediate- and high-risk NCS.	1	In patients with heart failure undergoing elective NCS, SGLT2i should be withheld for 3 to 4 days‡ before surgery when feasible to reduce the risk of perioperative metabolic acidosis.
			1	In patients scheduled for NCS, SGLT2i should be discontinued 3 to 4 days‡ days before surgery to reduce the risk of perioperative metabolic acidosis.
MINS (Top Take-Home Message 6)	1	In patients who have known CVD, cardiovascular risk factors (including age ≥65 years), or symptoms suggestive of CVD, it is recommended to measure hs-cTnT or hs-cTnI before intermediate- and high-risk NCS, and at 24 and 48 hours afterwards.	2b	In patients with known CVD, with symptoms of CVD, or age ≥65 years with cardiovascular risk factors undergoing elevated-risk NCS, it may be reasonable to measure cTn at 24 and 48 hours after surgery to identify myocardial injury.
	No corresponding guideline recommendation.		3: No Benefit	In patients undergoing low-risk NCS, routine postoperative screening with cTn levels is not indicated without signs or symptoms suggestive of myocardial ischemia or MI.
	No corresponding guideline recommendation.		2a	In patients who develop MINS, especially in those not previously known to have excess cardiovascular risk, outpatient follow-up is reasonable for optimization of cardiovascular risk factors.
	2b	In patients with MINS and at low risk of bleeding, treatment with dabigatran 110 mg orally b.i.d. may be considered from about 1 week after NCS.	2b	In patients who develop MINS, antithrombotic therapy may be considered to reduce thromboembolic events.

Continued on the next page

JACC ILLUSTRATION

Central Illustration: Major Changes in Perioperative Cardiovascular Management for Noncardiac Surgery

The AHA/ACC/Multisociety Perioperative Guideline provides a comprehensive overview of risk assessment, indicates the appropriate use of cardiovascular testing and screening, and outlines evidence-based management strategies spanning from preoperative to postoperative care stages.[1]

The *JACC* Central Illustration for this guideline underscores the importance of the 3 distinct stages—preoperative, intraoperative, and postoperative—serving as a call-to-action tool. It highlights key changes throughout the guideline, ensuring that healthcare professionals are equipped for optimizing patient outcomes across all phases of care.

COMPARISON TO PREVIOUS ACC/AHA/MULTISOCIETY GUIDELINE

The AHA/ACC/Multisociety Perioperative Guideline updates content previously covered in the 2014 Perioperative Guideline.[2] Table 1 outlines changes in stress testing, SGLT2i therapy, MINS, and AF management between the

TABLE 2 Continued

	ESC Guideline[3]		AHA/ACC/Multisociety Guideline[1]	
	COR*	ESC recommendation	COR*	AHA/ACC/Multisociety recommendation
Atrial fibrillation (Top Take-Home Message 7)	No corresponding guideline recommendation.		2a	In patients with rapid AF identified in the setting of NCS, it is reasonable to treat potential underlying triggers contributing to AF and rapid ventricular response (eg, sepsis, anemia, pain).
	2a	In patients with postoperative AF after NCS, long-term OAC therapy should be considered in all patients at risk of stroke, considering the anticipated net clinical benefit of OAC therapy, and informed patient preferences.	2a	In patients with new-onset AF identified in the setting of NCS, initiation of postoperative anticoagulation therapy can be beneficial after considering the competing risks associated with thromboembolism and perioperative bleeding.
			1	In patients with new-onset AF identified in the setting of NCS, outpatient follow-up for thromboembolic risk stratification and AF surveillance are recommended given a high risk of AF recurrence.
	3	Routine use of beta blocker for the prevention of postoperative AF in patients undergoing NCS is not recommended.	No corresponding guideline recommendation.	

*Colors in this table align with the classification system found in Table 3, "Applying American College of Cardiology/American Heart Association Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care," in the AHA/ACC/Multisociety Perioperative Guideline.[1]
†Poor functional capacity is considered <4 METs or a DASI score of ≤34.
‡Canagliflozin, dapagliflozin, and empagliflozin should be stopped ≥3 days and ertugliflozin ≥4 days before scheduled surgery.

ACC = American College of Cardiology; AF = atrial fibrillation; AHA = American Heart Association; b.i.d. = bis in die (twice a day); CABG = coronary artery bypass graft; CAD = coronary artery disease; COR = Class of Recommendation; cTn = cardiac troponin; CV = cardiovascular; CVD = cardiovascular disease; DASI = Duke Activity Status Index; ESC = European Society of Cardiology; hs-cTn = high-sensitivity cardiac troponin; MET = metabolic equivalent; MI = myocardial infarction; MINS = myocardial injury after noncardiac surgery; NCS = noncardiac surgery; OAC = oral anticoagulant; PCI = percutaneous coronary intervention; SGLT2i = sodium-glucose cotransporter-2 inhibitors.

2014 and 2024 versions of the guideline. The comparison focuses on Top Take-Home Messages 3, 5, 6, and 7.

For further details, refer to the corresponding sections of the AHA/ACC/Multisociety Perioperative Guideline[1]:

- Section 4.3. "Stress Testing"
- Section 6.3. "Heart Failure"
- Section 7.8. "Perioperative Management of Blood Glucose"
- Section 9.1. "Myocardial Injury After Noncardiac Surgery Surveillance and Management"
- Section 6.5. "Atrial Fibrillation"

COMPARISON OF AHA/ACC/MULTISOCIETY PERIOPERATIVE GUIDELINE TO ESC GUIDELINE

In 2022, the ESC published a guideline on cardiovascular assessment and management of patients undergoing noncardiac surgery.[3] Table 2 compares the recommendations related to stress testing, SGLT2i, MINS, and AF between the 2024 AHA/ACC/Multisociety Perioperative Guideline[1] and the 2022 ESC noncardiac surgery guideline.[3] The comparison focuses on Top Take-Home Messages 3, 5, 6, and 7.

For further details, refer to the corresponding sections of the 2022 ESC noncardiac surgery guidelines[3]:

- Section 4.5.2. "Stress Tests"
- Section 5.2.9. "Sodium-Glucose Co-Transporter-2 Inhibitors"
- Section 4.4. "Biomarkers"
- Section 8.7. "Perioperative Stroke"

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