

CHAPTER 17

Workflow and Deployment of the Multidisciplinary Heart Team Model in the Management of Complex Coronary Artery Disease

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Introduction

The Heart Team model was initially established to formalize multidisciplinary discussion and decision-making for patients with complex coronary artery disease (CAD),¹ and has since been expanded to valvular heart disease.² The Heart Team approach for decision-making in patients with multivessel CAD was first required by the 2010 European Society of Cardiology and European Association for Cardiothoracic Surgery guidelines on myocardial revascularization.³ In the United States, use of a Heart Team was suggested in the ACCF/SCAI/STS/AATS/AHA/SDNC/FHSA/SCCT appropriate use criteria for coronary revascularization in 2012,⁴ and formally recommended as a class I recommendation in the 2014 focused update to the ACC/AHA/SCAI/STS guidelines for management of stable ischemic heart disease in patients with complex CAD and diabetes.⁵ This updated recommendation was made based on evidence from the BARI,⁶ SYNTAX⁷ and FREEDOM⁸ trials, which compared multivessel percutaneous coronary intervention (PCI) to coronary artery bypass surgery (CABG), and included assessment by both an interventional cardiologist and cardiac surgeon in their pre-randomization protocol. More recently, the EXCEL, NOBLE, and SYNTAX II trials, comparing PCI to CABG for left main coronary artery disease, also incorporated a formal Heart Team discussion.

Composition of the team

In clinical practice, the Heart Team has expanded beyond the interventional cardiologist and cardiac surgeon dyad. The referring cardiologist or team are included, as well as the other interventionalists and surgeons in the group (and their fellows/trainees), and relevant specialists to discuss the comorbidities that may affect procedural risk (such as heart failure specialists, gastroenterology, oncology, nephrology, hematology, neurology, geriatrics). Experts in imaging (such as coronary computed tomography, nuclear imaging) have also been included in the Heart Team to discuss complex multimodality imaging assessment of anatomy, ischemic burden, and viability. By comprehensive inclusion of multi-specialty experts to the evaluative process, both objectivity and evidence-based medicine may be prioritized, while ideally minimizing any biased variation in surgical or interventional practices.

Schedule of meetings

In our institution, regularly scheduled Heart Team meetings take place weekly to review outpatient referrals. For new inpatient cases of complex CAD, in addition to a cardiac surgical consultation, the patient also receives a complex/high-risk PCI consultation from the interventional team. The Heart Team then meets ad hoc, ideally within 24 hours of the interventional and surgical team assessments. It is paramount that this interdisciplinary assessment and team-based review be expedited in a timely manner, in order to avoid delays in decision-making and delivery of patient care.

Meeting content

Patients are assessed in consultation by both the interventionalist and cardiac surgeon independently prior to the meeting. Additional relevant specialists are also consulted if the patients' coexisting comorbidities might influence procedural risk or prognosis.

The clinical history, prior interventional and surgical history, and non-cardiac comorbidities are then reviewed at the Heart Team meeting (Figure, Table 1). Symptoms are described by Canadian Cardiovascular Society (CCS) Angina and New York Heart Association (NYHA) class; in some cases, assessment of exercise limitation and symptoms can be quantified by patient-reported outcome tools (e.g. Seattle Angina Questionnaire) and exercise testing results.

The coronary anatomical burden and complexity are then described by the SYNTAX Score. Patient-specific estimates of surgical or PCI mortality or morbidity are described by the STS, SYNTAX II and ACC-NCDR PCI scores. The coronary angiograms and imaging data are presented, and risks and benefits of revascularization modalities discussed, after which each interventionalist and surgeon gives their thoughts, and a group consensus is reached. Review of the Massachusetts General Hospital Heart Team experience recently demonstrated that approximately 50% of patients undergo PCI, 30% undergo CABG, and 20% of patients are initially recommended for medical stabilization.⁹ The Heart Team recommendation favored PCI or medical therapy in more patients with a higher STS risk score. In addition, both the cardiac surgical and cardiology divisions have noted increased collaboration and collegiality via the Heart Team process.

Communication with patient and family

The critical element in deploying a successful multidisciplinary heart team to practice is involvement of the patient and family in the decision-making process and clear communication with regards to team-based recommendations. In this model, the consensus of the team meeting is presented to the patient and family, often by both the interventionalist and cardiac surgeon who were the primary consultants on the case. The ultimate decision regarding surgical revascularization, PCI or optimal medical therapy is then executed according to the team's consensus recommendations in conjunction with shared decision-making performed at the bedside.

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Tables

Table 1: Massachusetts General Hospital Heart Team Meeting Data Elements

Diagnosis	Stable vs. unstable angina, NSTEMI, STEMI on presentation Heart failure history Ventricular arrhythmia history Syncope
Anginal class	
NYHA class	
Surgical valve disease	
Ejection fraction	
Angiographic information	AHA $\geq 70\%$ or FFR ≤ 0.8 (IFR ≤ 0.9); ESC 51%-90% with ischemia/FFR/IFR; or 91%+ For left main: $\geq 50\%$ stenosis; ostial LAD+CFX 70%=LM equivalent
Hemodynamic information	
SYNTAX score	0-22 low tertile, 23-32 intermediate, 33+ high
www.syntaxscore.com/calculator/start.htm	
STS score	Estimated % mortality, % morbidity or mortality, % stroke
http://riskcalc.sts.org	AHA: High-risk STS $\geq 5\%$; EHJ 2013: Low-risk $< 3\%$; Interm 3-8%, High $> 8\%$)
SYNTAX II	Points and 4-year estimated mortality for CABG, PCI
http://www.syntaxscore.com/calculator/syntaxscore/framesets2.htm	
DAPT candidacy (12 months)	
DAPT score	
Anticoagulation at baseline?	Indication
HAS-BLED score	
Diabetes	HbA1c value, medications (oral vs. insulin vs. diet)
Echocardiographic data	Ejection fraction, LV end-diastolic dimensions, RV function, RV systolic pressure, degree of mitral regurgitation, aortic stenosis, tricuspid regurgitation
Ischemia testing	Date, modality, results
Viability testing	Date, modality (MRI, FDG-PET, Thallium), results

Clinical risk factors	Creatinine, hematocrit, platelets, INR, COPD (if yes, FEV1), peripheral arterial disease (and anatomic details), cerebrovascular disease (and if history of stroke, bleed)
NCDR PCI risk score http://www.scai.org/PCIRiskAssessmentTools/default.aspx	
Frailty (Canadian Study of Health and Ageing) Score (10)	https://openheart.bmj.com/content/openhrt/1/1/e000033/F2.large.jpg
Comorbidities	Cirrhosis (include MELD), cancer, RV dysfunction, fragility, severe obesity, coagulopathy/hemophilia, history of radiation therapy, severely calcified aorta, immunosuppression, history of severe stroke, limited life expectancy
ACC/AHA Recommendation based on most recent Appropriate Use Criteria	
ESC recommendation based on 2018 Guidelines	
Discussion	
Technical feasibility - CABG	If not- documentation of reason (fragility not captured in the STS score, poor targets, absent conduits, prohibitive aortic calcification, prior chest radiation, bleeding risk)
Technical feasibility- PCI	If not- documentation of reason (active bleeding, support limitations, not DES candidate)
Final recommendation	CABG, PCI, hybrid (CABG+PCI, PCI+TAVR, BAV+PCI), medical therapy, defer/additional studies/evaluation needed
CAD Heart Team members in attendance	
Date	

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