Multidisciplinary Team Approach in Cardiovascular Disease

Amar Annapureddy MD MSc
Edward O'Leary MD MBA

Case Study

75 year old male with a history of lung cancer, renal insufficiency, severe aortic stenosis and diabetes was admitted with NSTEMI.

Coronary angiogram demonstrated severe three vessel coronary artery disease.

Echocardiogram was significant for LVEF of 45%, SVI = 33 mL/m2, Aortic MVG = 43 mm Hg.

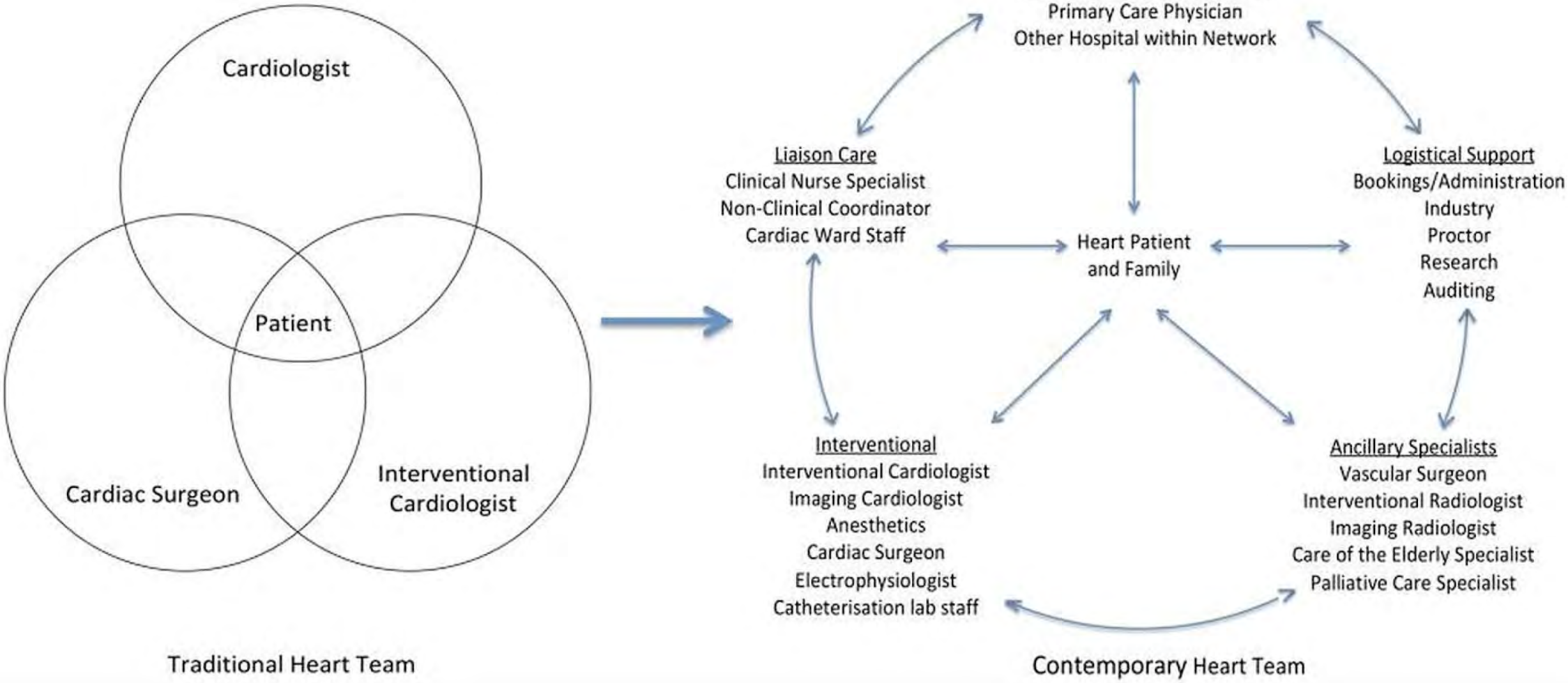
Next steps?

Early Proven Team Approach

- Oncology
- Critical Care Medicine
- Biopsychosocial Medicine
- Heart Transplantation

How Did We Get Here?

- 2005: SYNTAX trial demonstrated shared, team-based decision- making process
  - Heart-team concept. Each clinical case and angiogram was reviewed by a team consisting of an interventionist and a surgeon. After review, consensus agreement was obtained as to which procedure or procedures the patient may be eligible for.
- 2010: ESC/EACTS guidelines recommended Heart Team approach for revascularization (Class 1)
- 2012: CMS formalized reimbursement for the TAVR Heart Team
- 2014 ACC/AHA/AATS/PCNA/SCAI/STS focused update on the diagnosis and management of patients with stable ischemic heart disease: a report of the ACC/AHA Task Force on Practice Guidelines. Circ 2014;130:1749-1767



Archibold A et al Heart 2022;108

JACC: ADVANCES

EXPERT PANEL

The Multidisciplinary Heart Team in Cardiovascular Medicine

Current Role and Future Challenges

Wayne B. Batchelor, MD, MHS,[a] Saif Anwaruddin, MD,[b] Dee Dee Wang, MD,[c] Elizabeth M. Perpetua, DNP,[d,e] Ashok Krishnaswami, MD, MAS,[f,g] Poonam Velagapudi, MD,[h] Janet F. Wyman, DNP,[i] David Fullerton, MD,[j] Patricia Keegan, DNP,[k] Alistair Phillips, MD,[l] Laura Ross, PA-C,[m] Brij Maini, MD,[n] Gwen Bernacki, MD, MHSA,[o,p] Gurusher S. Panjrath, MD,[q] James Lee, MD,[c] Jeffrey B. Geske, MD,[r] Fred Welt, MD,[s] Prashanth D. Thakker, MD,[t] Anita Deswal, MD, MPH,[u] Ki Park,[v] Michael J. Mack, MD,[w] Martin Leon, MD,[x] Sandra Lewis, M

VOL. 2, NO. 1, 2023

Guideline or consensus statement

Getting the best from the Heart Team: guidance for cardiac multidisciplinary meetings

Andrew Archbold,[1] Enoch Akowuah,[2] Adrian P Banning,[3] Andreas Baumbach,[4,5] Peter Braidley,[6] Graham Cooper,[6] Simon Kendall,[2] Philip MacCarthy,[7] Peter O'Kane,[8] Niall O'Keeffe,[9] Benoy Nalin Shah,[10] Victoria Watt,[11] Simon Ray[11]

ACC/AHA/SCAI CLINICAL PRACTICE GUIDELINE

2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice

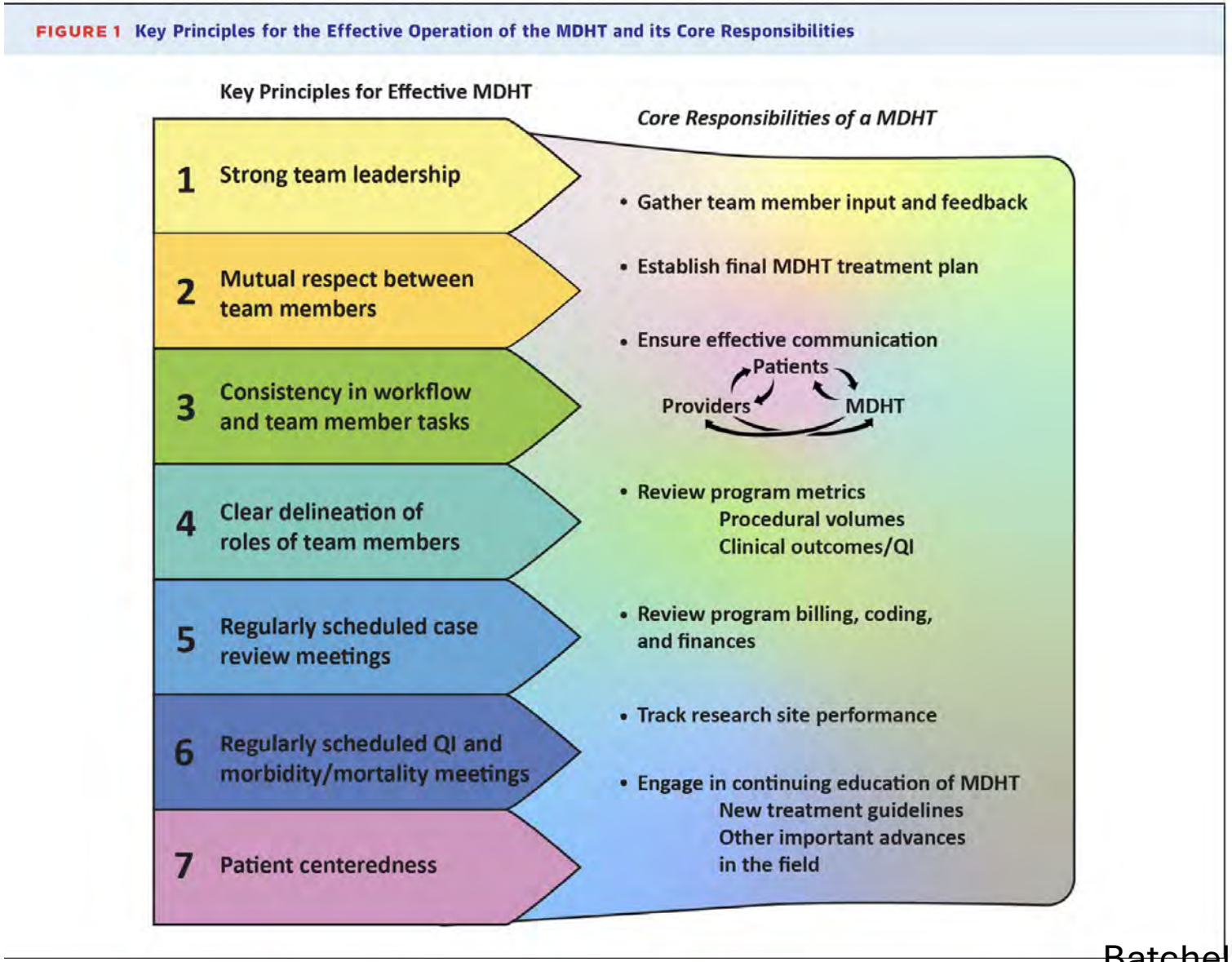
Comprehensive Review

Building and Optimizing the Interdisciplinary Heart Team

Christopher Lee, MD [a], Andrew Tully, MD [b], James C. Fang, MD [c], Lissa Sugeng, MD, MPH [d], Sammy Elmariah, MD, MPH [e], Kendra J. Grubb, MD, MHA [b], Michael N. Young, MD [a,*]

[a] *Heart and Vascular Center, Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire;* [b] *Department of Cardiothoracic Surgery, Emory University, Atlanta, Georgia;* [c] *Division of Cardiology, University of Utah Health, Salt Lake City, Utah;* [d] *Department of Cardiology, Northwell Health, Manhasset, New York;* [e] *Division of Cardiology, University of California San Francisco, San Francisco, California*

Key Principles for Effective Operation



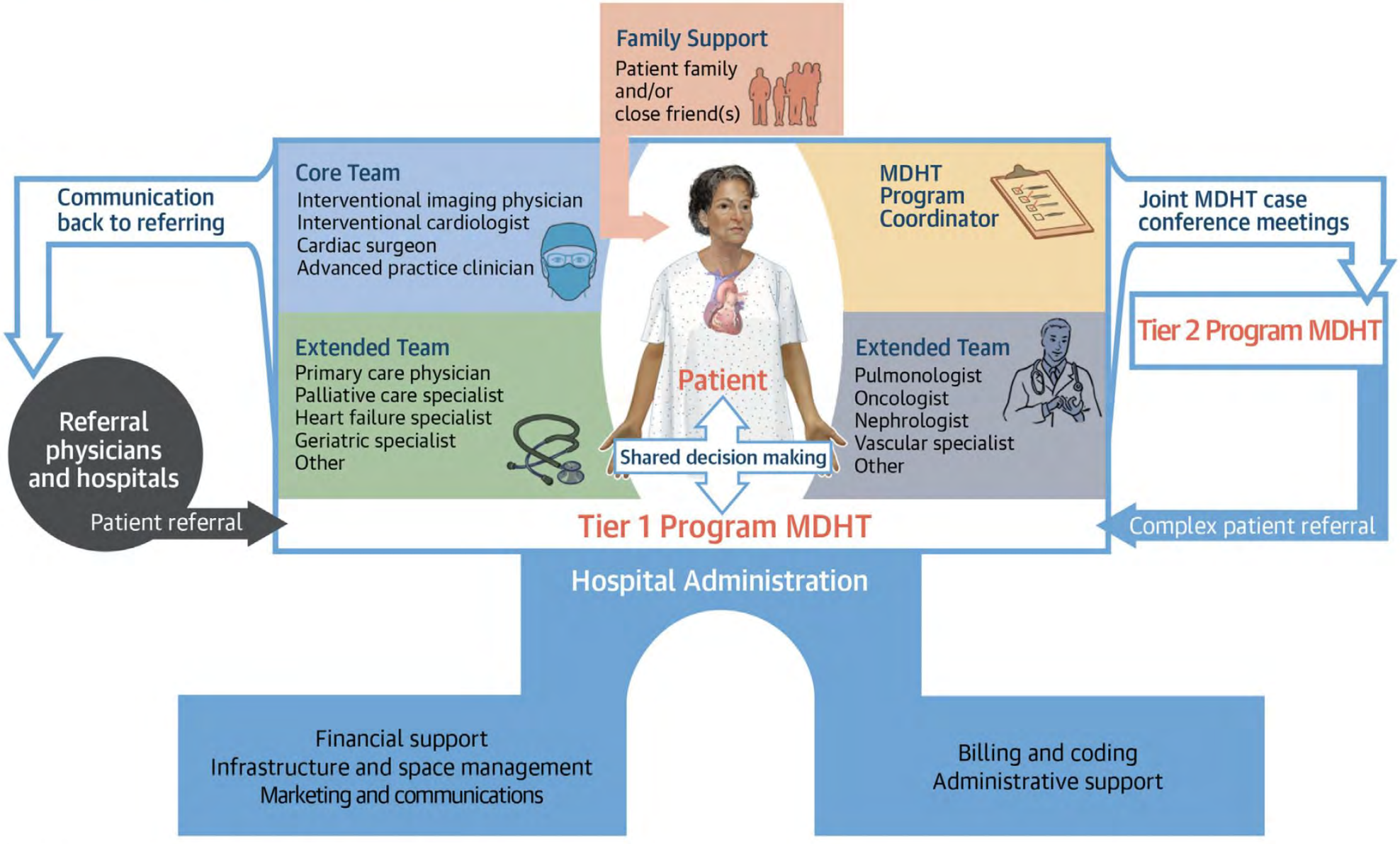
Batchelor et al JACC Advances Jan 2023

Five Star Approach

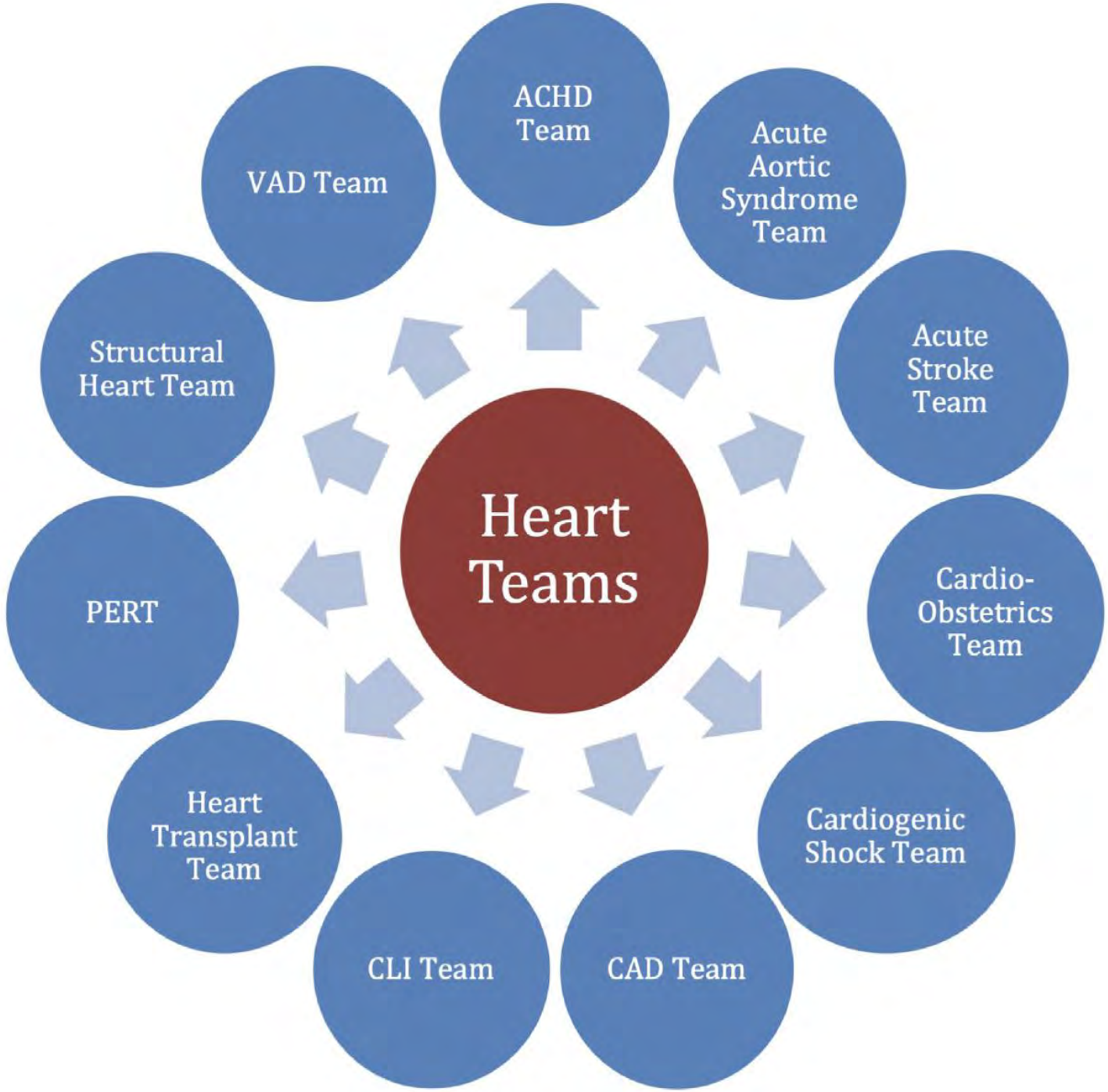
- Adopts an Institutional Protocol for Accountability
- Utilizes Templates and AUC Scoring Systems as Appropriate
- Fosters Diversity of Opinion and Consensus of Recommendation
- Creates an Official Recommendation to Present the Patient for SDM
- Employs Feedback Mechanisms

Lee C et al JSCAI 2 (2023) 101067

CENTRAL ILLUSTRATION Conceptual Framework for the MDHT



Batchelor WB, et al. JACC Adv. 2023;2(1):100160.


Heart Teams
ACHD Team
Acute Aortic Syndrome Team
Acute Stroke Team
Cardio-Obstetrics Team
Cardiogenic Shock Team
CAD Team
CLI Team
Heart Transplant Team
PERT
Structural Heart Team
VAD Team

Cardiovascular Multidisciplinary Teams

- Structural Heart Teams
- Heart Failure/Transplant
- Complex Coronary Teams
- Pulmonary Embolism Response Team (PERT)
- Adult Congenital Heart Disease
- Cardiogenic Shock Team
- Cardio-Obstetrics
- Cardio-Oncology
- Geriatric Cardiology
- Patients and their Families
- General Cardiology
- Interventional Cardiology
- Cardiothoracic surgery
- Cardiac Imaging
- Cardiac Anesthesiology
- Primary Care
- Nursing
- Social Work

Coronary Revascularization

- Patient and Family
- Interventional Cardiology
- Cardiothoracic Surgery
- Clinical cardiology
- Imaging Services
- Critical care
- Cardiac anesthesia
- Advanced NP support
- Advanced support device teams
- Clinic services
- Palliative care

- CABG vs High Risk PCI vs Medical Management

2021 ACC/AHA/SCAI Revascularization Guidelines

3. PREPROCEDURAL ASSESSMENT AND THE HEART TEAM

3.1. The Heart Team

Recommendation for the Heart Team
Referenced studies that support the recommendation are summarized in Online Data Supplement 2.

COR	LOE	Recommendation
1	B-NR	1. In patients for whom the optimal treatment strategy is unclear, a Heart Team approach that includes representatives from interventional cardiology, cardiac surgery, and clinical cardiology is recommended to improve patient outcomes.[1-7]

Table 4. Factors for Consideration by the Heart Team

Coronary Anatomy
Left main disease
Multivessel disease
High anatomic complexity (ie, bifurcation disease, high SYNTAX score)
Comorbidities
Diabetes
Systolic dysfunction
Coagulopathy
Valvular heart disease
Frailty
Malignant neoplasm
End-stage renal disease
Chronic obstructive pulmonary disease
Immunosuppression
Debilitating neurological disorders
Liver disease/cirrhosis
Prior CVA
Calcified/porcelain aorta
Aortic aneurysm

Procedural Factors
Local and regional outcomes
Access site for PCI
Surgical risk
PCI risk
Patient Factors
Unstable presentation or shock
Patient preferences
Inability or unwillingness to adhere to DAPT
Patient social support
Religious beliefs
Patient education, knowledge, and understanding

2021 AAA/AHA/SCAI Coronary Revascularization Guidelines

Criteria for High-risk PCI

PATIENT RELATED CRITERIA

- Age
- Heart failure
- Prior cardiac surgery
- Concomitant valve disease
- Diabetes
- Chronic Obstructive Disease
- Chronic Kidney Disease
- Peripheral Vascular Disease

CORONARY ANATOMY

- Multivessel Disease
- Unprotected Left Main
- Last remaining vessel
- CTO
- Calcified lesion
- Long lesion
- Complex bifurcation lesions

HEMODYNAMIC STATUS

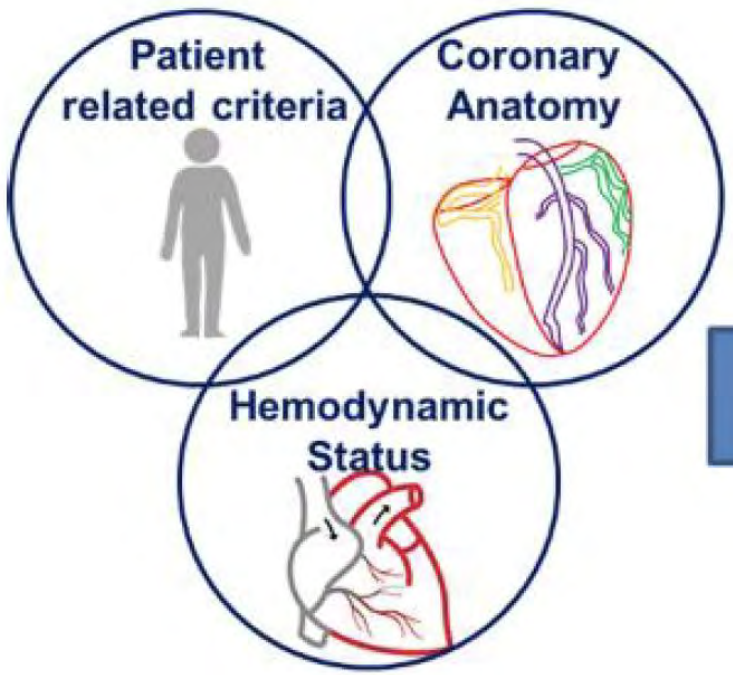
- Increased LV end-diastolic pressure
- Impaired cardiac output
- Lower mean arterial pressure
- Anticipated prolonged ischemic time
- Large area of myocardium at risk
- Ventricular arrhythmias

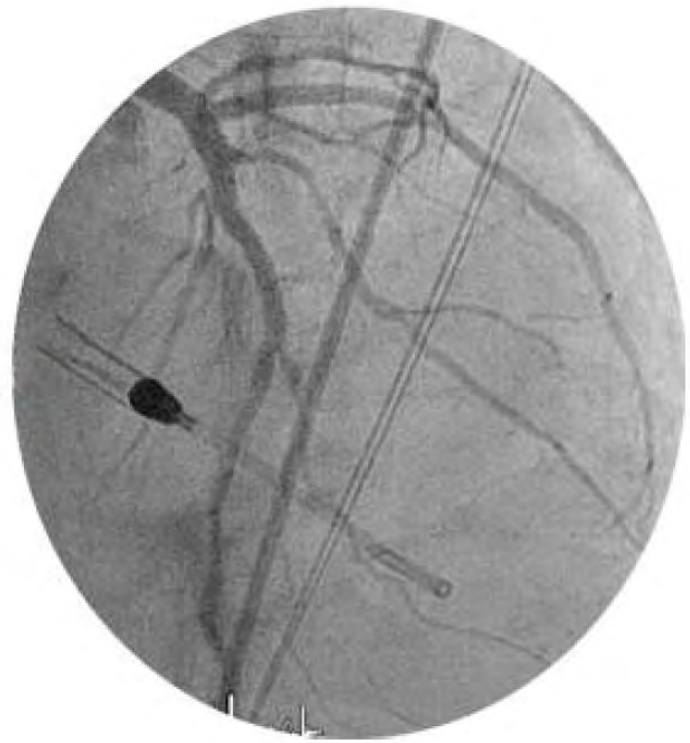
Leick J et al European Heart J 2022;24 Supplement

High-Risk PCI features

Heart Team

Protected-PCI





Leick J et al European Heart J 2022;24 Supplement

High-Risk PCI Predictors

➢6,000 patients (without pLVAD)

Characteristics

• > 80 y/o	3 points
• Dialysis	6 points
• LVEF < 30%	2 points
• > 2 lesions Rx'd	2 points

Risk

• Low	0-1 points
• Intermediate	2-3 points
• High	> 4 points

One Year Mortality

• Low	1.24%
• Intermediate	2.47%
• High	10.86%

Brener SJ J Invasive Cardiol 2021;33:E253-E258

Journal of the American Heart Association

ORIGINAL RESEARCH

Multidisciplinary Heart Team Approach for Complex Coronary Artery Disease: Single Center Clinical Presentation

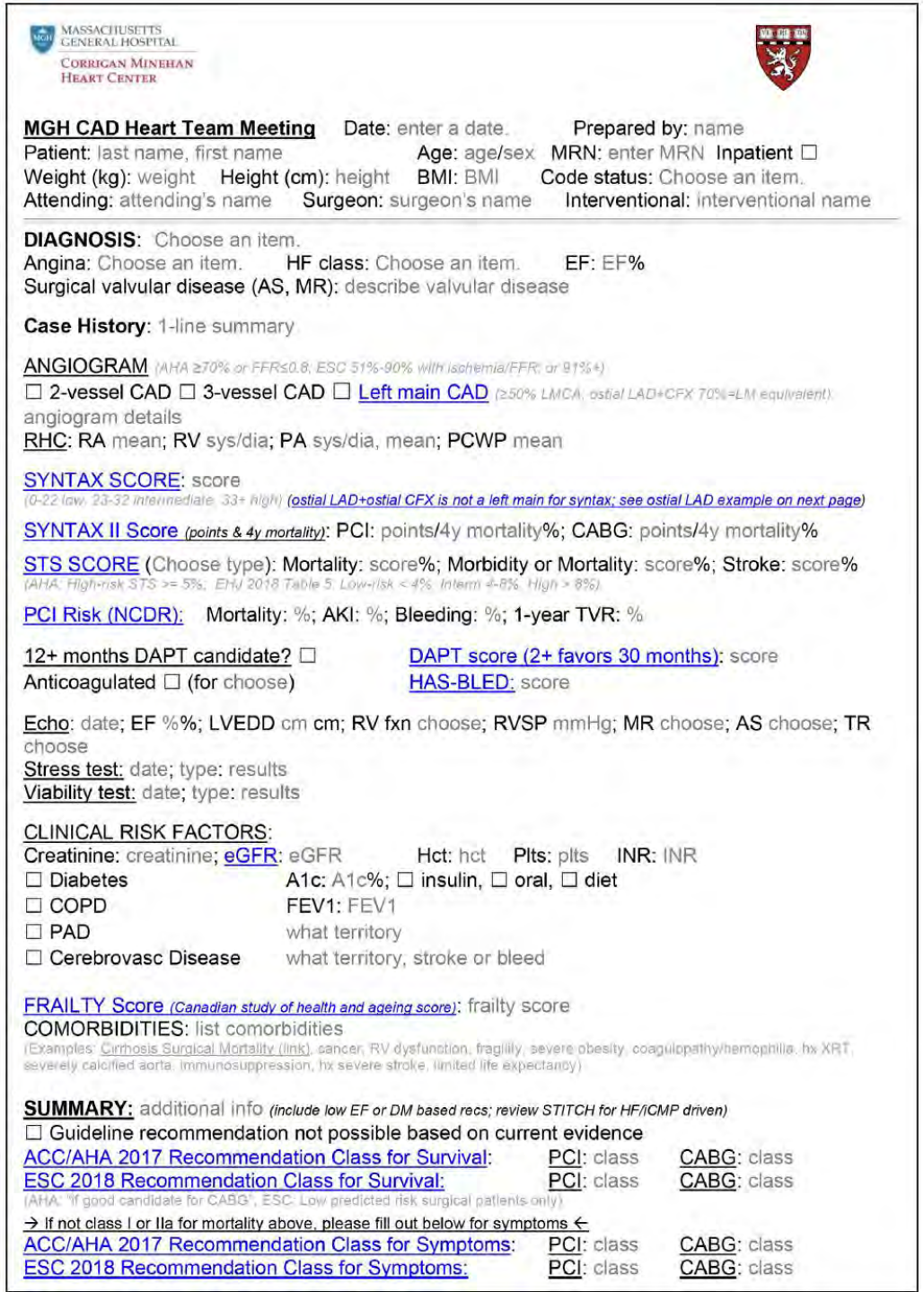
Michael N. Young, MD*; Dhaval Kolte, MD, PhD*; Mary E. Cadigan, RN, MSN; Elizabeth Laikhter, BA; Kevin Sinclair, MS; Eugene Pomerantsev, MD, PhD; Michael A. Fifer, MD; Thoralf M. Sundt, MD; Robert W. Yeh, MD, MSc; Farouc A. Jaffer, MD, PhD

Heart Team Approach

- Retrospective analysis
- Jan 2015 to Nov 2018
- N=166 high risk patients

  129 revascularization
- US and ESC Guidelines, Syntax grading, PCI risk scores
- IC and CT surgery consult svc

Young MN et al JAHA September 2024



MASSACHUSETTS GENERAL HOSPITAL
CORRIGAN MINEHAN HEART CENTER

MGH CAD Heart Team Meeting Date: enter a date. Prepared by: name
Patient: last name, first name Age: age/sex MRN: enter MRN Inpatient ☐
Weight (kg): weight Height (cm): height BMI: BMI Code status: Choose an item.
Attending: attending's name Surgeon: surgeon's name Interventional: interventional name

DIAGNOSIS: Choose an item.
Angina: Choose an item. HF class: Choose an item. EF: EF%
Surgical valvular disease (AS, MR): describe valvular disease

Case History: 1-line summary

ANGIOGRAM *(AHA ≥70% or FFR≤0.8; ESC 51%-90% with ischemia/FFR; or 91%+)*
☐ 2-vessel CAD ☐ 3-vessel CAD ☐ Left main CAD *(≥50% LMCA; ostial LAD+CFX 70%=LM equivalent)*
angiogram details
RHC: RA mean; RV sys/dia; PA sys/dia, mean; PCWP mean

SYNTAX SCORE: score
(0-22 low; 23-32 intermediate; 33+ high) *(ostial LAD+ostial CFX is not a left main for syntax; see ostial LAD example on next page)*

SYNTAX II Score *(points & 4y mortality)*: PCI: points/4y mortality%; CABG: points/4y mortality%

STS SCORE (Choose type): Mortality: score%; Morbidity or Mortality: score%; Stroke: score%
(AHA: High-risk STS >= 5%; EHJ 2018 Table 5: Low-risk < 4%, Interm 4-8%, High > 8%)

PCI Risk (NCDR): Mortality: %; AKI: %; Bleeding: %; 1-year TVR: %

12+ months DAPT candidate? ☐ DAPT score (2+ favors 30 months): score
Anticoagulated ☐ (for choose) HAS-BLED: score

Echo: date; EF %%; LVEDD cm cm; RV fxn choose; RVSP mmHg; MR choose; AS choose; TR choose
Stress test: date; type: results
Viability test: date; type: results

CLINICAL RISK FACTORS:
Creatinine: creatinine; eGFR: eGFR Hct: hct Plts: plts INR: INR
☐ Diabetes A1c: A1c%; ☐ insulin, ☐ oral, ☐ diet
☐ COPD FEV1: FEV1
☐ PAD what territory
☐ Cerebrovasc Disease what territory, stroke or bleed

FRAILTY Score *(Canadian study of health and ageing score)*: frailty score
COMORBIDITIES: list comorbidities
(Examples: Cirrhosis Surgical Mortality (link), cancer, RV dysfunction, fragility, severe obesity, coagulopathy/hemophilia, hx XRT, severely calcified aorta, immunosuppression, hx severe stroke, limited life expectancy)

SUMMARY: additional info *(include low EF or DM based recs; review STITCH for HF/ICMP driven)*
☐ Guideline recommendation not possible based on current evidence
ACC/AHA 2017 Recommendation Class for Survival: PCI: class CABG: class
ESC 2018 Recommendation Class for Survival: PCI: class CABG: class
(AHA: "if good candidate for CABG", ESC: Low predicted risk surgical patients only)
→ If not class I or IIa for mortality above, please fill out below for symptoms ←
ACC/AHA 2017 Recommendation Class for Symptoms: PCI: class CABG: class
ESC 2018 Recommendation Class for Symptoms: PCI: class CABG: class

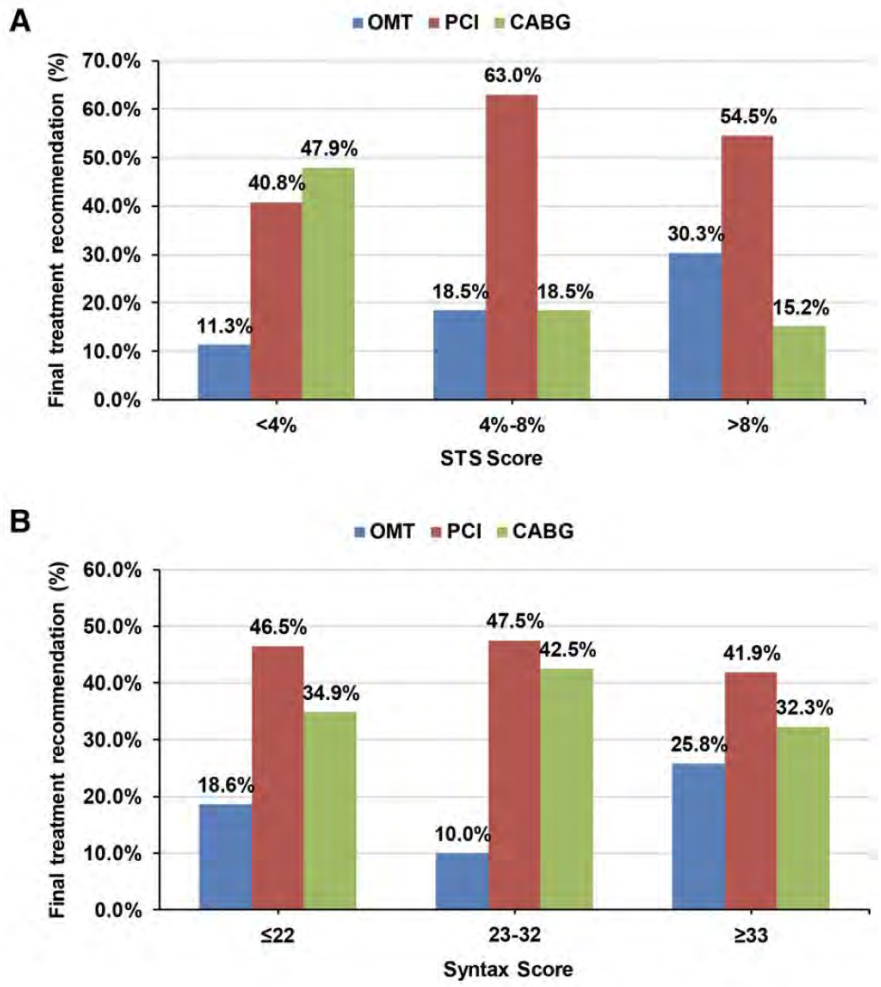
Heart Team Approach

In-hospital mortality rate for CABG/PCI = 3.9%

30-day mortality rate (2.2%) was lower than expected

HT meetings well attended

Organization and implementation of HT is achievable and provides a formalized construct to guide medical decision-making.



Young MN et al JAHA September 2024

Valvular Heart Disease

- Patient and Family
- Interventional Cardiology
- Imaging Cardiology
- Cardiothoracic Surgery
- Advanced NP
- Support personnel
- Pharmacy
- Geriatric cardiology
- Palliative care

- Evolved since PARTNER A Trial
- 20% reduction in 5-year risk-adjusted mortality after implementing Heart Team Approach

Heart Failure and Cardiac Transplantation

- Patient and Family
- Heart Failure Specialists
- Advanced NP
- Program Coordinators
- Critical Care
- Cardiothoracic
- Nephrologists
- Pulmonary
- LVAD nurses
- Palliative Care

- Improved quality of care
- Patient engagement
- Medication safety
- Reduced LOS
- Reduced readmissions
- Transplant evaluation
- Advanced Device Therapies

Cardio-Oncology Team

- Patient and Family
- Cardiology
- Hematology-Oncology
- Advanced NP
- Pharmacy
- International Cardiac Tumor Board

- Comprehensive care with cardiovascular disease and cancer

Cardiogenic Shock Team

- Patient and Family
- Advanced Heart Failure Cardiology
- Interventional Cardiology
- Cardiothoracic Surgery
- Critical Care

- Faster response times for management of patients
- Improved 30-day mortality rate at single center
- 28% decreased mortality rate multicenter
  - 10 shock teams
  - 1,242 patients

1. Lee F, Hutson JH, Boodhwani M, et al.. CJC Open. 2020;2(4):249–257.
2. Taleb I, Koliopoulou AG, Tandar A, et al. Circulation. 2019;140(1):98–100.
3. Tehrani BN, Truesdell AG, Sherwood MW, et al. J Am Coll Cardiol. 2019;73(13):1659–1669.
4.Papolos AI, Kenigsberg BB, Berg DD, et al.. J Am Coll Cardiol. 2021;78(13):1309–1317.

Pulmonary Embolism Response Team

- Patient and Family
- Cardiology
- Vascular Medicine
- Emergency Medicine
- Cardiothoracic Surgery
- Interventional Radiology
- Hospital Medicine
- Pulmonary and Critical Care

- Decreased ICU stay
- Standardized treatment plan
- Improved time to treatment
- Improved 30-day mortality

1.Kabrhel C, Jaff MR, Channick RN, Baker JN, Rosenfield K. Chest. 2013;144(5):1738–1739.
2. Zern EK, Young MN, Rosenfield K, Kabrhel C. Expert Rev Cardiovasc Ther.2017;15(6):481–489.
3. Chaudhury P, Gadre SK, Schneider E, et al.. Am JCardiol. 2019;124(9):1465–1469.
4. Xenos ES, Davis GA, He Q, Green A, Smyth SS. J Vasc Surg Venous Lymphat Disord. 2019;7(4):

Challenges to the Multidisciplinary Team

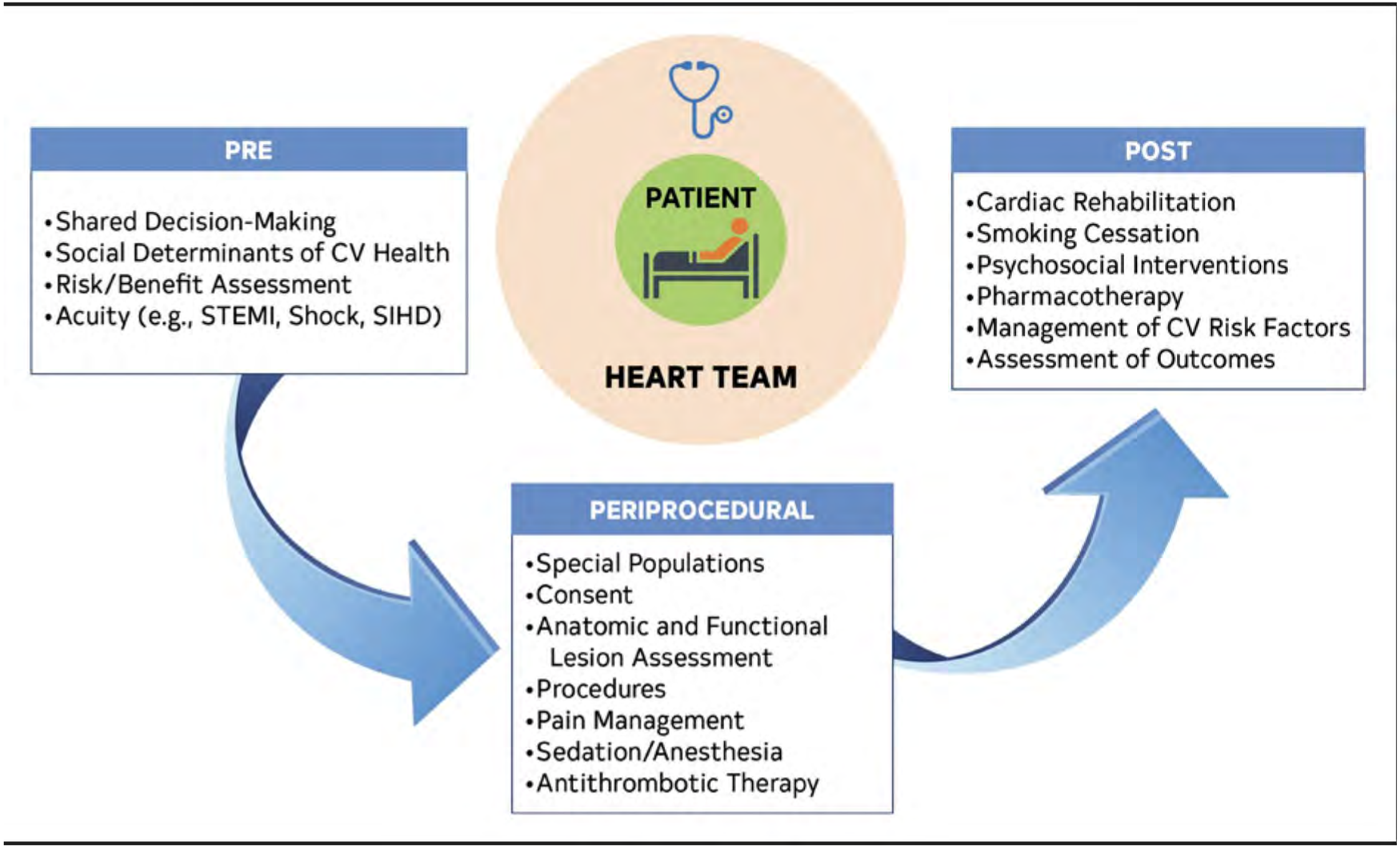
- Scheduling Issues
- Patients seen by different providers
- Patients undergo multiple diagnostic tests
- Financial burden
- Psychological burden
- Provider team times
- Administrative support
- Health care disparities
- Maintaining up to date information

Future Directions

- Insufficient Outcome Data
- No RCT comparing Team vs No Team given professional society recommendations (e.g. Parachute Study)
- Future Advanced Technology

High Risk PCI

- Long procedure times
- Advanced skill sets
- LV support devices – PROTECT-I, PROTECT-II, PROTECT-III
- One year mortality rate ranges from 1 to 11% depending on comorbidities



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