

# Care of the Postmyocardial Infarction Patient

MAJ Craig Barstow, MD



**FMX**

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## MAJ Craig Barstow, MD

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Dr. Barstow is a graduate of the Uniformed Services University of the Health Sciences – F. Edward Herbert School of Medicine in Bethesda, Maryland. He completed undergraduate studies at the U.S. Military Academy. Dr. Barstow joined the Womack Army Medical Center Family Medicine Residency Program in 2012, and created the fellowship program, accepting the first fellow in July 2015. He is the former program director of the hospitalist fellowship at Womack Army Medical Center. His areas of interest include inpatient family medicine, newborn care, and point-of-care ultrasound teaching.

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# Learning Objectives

1. Identify hospitalized patients for MI who are at increased risk for readmission.
2. Develop a collaborative treatment plan for common cardiovascular conditions, taking gender differences into account, emphasizing medication adherence and monitoring.
3. Establish a multidisciplinary approach before discharge of patients hospitalized for MI.

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# Audience Engagement System



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## Case 1

Mike is a 64-year old male who presents to your clinic. He was discharged from the hospital 2 days ago after a non-ST elevation myocardial infarction. During his hospital stay, angiography was performed and 2 drug-eluting stents were placed. Mike wants to know what he can do to prevent another heart attack.

## Poll Question 1

Which of the following is the biggest risk factor for a repeat myocardial infarction?

- A. Obesity
- B. Smoking
- C. Hypertension
- D. Diabetes

## Risk of Repeat MI

4-8% of patients with an MI will have a second MI within 5 years

- 2.65% in the first year
- 1% per year for each year afterwards

## Risk Factors for Repeat MI

- Diabetes (HR 2.013)
- Two or more previous MI HR (HR 1.54)
- Advancing age

Nakatani D, Sakata Y, Suna S, et al. Incidence, Predictors, and Subsequent Mortality Risk of Recurrent Myocardial infarction in patients following discharge for acute myocardial infarction. *Circ J.* 2013;77:439-446.

## Secondary Prevention Lifestyle Modification

- Smoking cessation
- Exercise

## Smoking Cessation

- After 5 years of smoking abstinence
  - Mortality and morbidity reduced to non-smoking levels
  - For smokers who quit after MI – RR 0.63 (ARR 6.4% NNT 15.6)
- Smoking cessation is recommended for all patients with CAD

Gerber Y, Rosen LJ, Goldbourt U, et al. Smoking status and long-term survival after first acute myocardial infarction. JACC. 2009;54:2382-2387.

# Smoking Cessation

Smoking cessation is recommended for all patients with CAD

- Referral and pharmacotherapy are recommended if needed
- Bupropion and nicotine replacement therapy are equivalent
- Varenicline is superior to both
- No tobacco cessation medications are associated with increased cardiovascular risks

Prochaska JJ, Benowitz NL. Smoking cessation and the cardiovascular patient. *Curr Opin Cardiol.* 2015;305: 506-511.

## Smoking Cessation Recommendations

Patients should be asked about tobacco use status at every office visit. (Class IB)

Every tobacco user should be advised to quit at every visit. (Class IA)

Patients should be assisted by counseling and by development of a plan for quitting that may include pharmacotherapy and/or referral to a smoking cessation program. (Class IA)

Smith SC, Benjamin EJ, Bonow RO, et al. AHA/ACC Secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic vascular disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation. *Circulation.* 2011; 124: 2342-2346.

## Post MI interventions All Cause Mortality

Smoking cessation

NNT 15.6

## Exercise

- Moderate intensity exercise
  - 30-60 minutes of exercise five to 7 days a week
  - Reduces cardiovascular mortality (RR 0.74)
  - Does not reduce risk of MI, revascularization or all cause mortality

## Exercise

- Daily walking can be started after discharge
- Aerobic exercise can begin 1-2 weeks after discharge
- Mild to moderate strength training can started 2-4 weeks after aerobic exercise

## Exercise Recommendations

All eligible patients with ACS or whose status is immediately post coronary artery bypass surgery or post-PCI should be referred to a comprehensive outpatient cardiovascular rehabilitation program either prior to hospital discharge or during the first follow-up office visit. (Class IA)

A home-based cardiac rehabilitation program can be substituted for a supervised, center-based program for low-risk patients. (Class IA)

Smith SC, Benjamin EJ, Bonow RO, et al. AHA/ACC Secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic vascular disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation. Circulation. 2011; 58: 2342-2346.

## Post MI interventions All Cause Mortality

Smoking cessation	NNT 15.6
Cardiac rehabilitation	NA

## Depression

- Depression is common in patients after MI
- Treatment may improve quality of life
  - Treatment has not been shown to improve cardiovascular outcomes
- No one medication is more effective
  - SSRI is a reasonable first choice

## Depression Recommendations

For patients with recent coronary artery bypass graft surgery or myocardial infarction, it is reasonable to screen for depression if patients have access to case management, in collaboration with their primary care physician and a mental health specialist. (Class lib, LOE C)

Smith SC, Benjamin EJ, Bonow RO, et al. AHA/ACCF Secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic vascular disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation. Circulation. 2011; 58: 2342-2346.

## Driving After an MI

- United States and most countries do not prohibit driving after MI
- Some recommend no driving
  - 4 weeks after CABG
  - 2 weeks after MI
  - 2 days after stent

## Secondary Prevention Medical Therapy

- Blood pressure control
- Cholesterol management
- Anti-platelet
- Beta-blockade
- Anti-anginal

## Blood Pressure Control

- ACC/AHA recommends goal 140/90
- Eighth Joint National Committee recommends goal
  - 150/90 patients over 60
  - 140/90 younger than 60

## Blood Pressure Control

### SPRINT trial 2015

- 9,361 patients with hypertension and increased risk of CVD
  - Included patients with known CAD
- Randomized to
  - Intensive treatment: systolic < 120
  - Standard treatment: systolic < 140

## SPRINT Trial 2015

### Intensive treatment vs. Standard treatment

- 1.2% ARR all-cause mortality (NNT 83)
- 0.8% ARR heart failure (NNT 125)
- No change in MI, ACS, stroke
- More hypotension, acute kidney injury, electrolyte abnormalities

SPRINT Research Group. A randomized trial of intensive versus standard blood-pressure control. *NEJM*. 2015;373: 2103-2116.

# Hypertension Recommendations

All patients should be counseled regarding the need for lifestyle modification: weight control; increased physical activity; alcohol moderation; sodium reduction; and emphasis on increased consumption of fresh fruits, vegetables, and low-fat dairy products. (Class I, LOE B)

Patients with blood pressure  $\geq 140/90$  mm Hg should be treated, as tolerated, with blood pressure medication, treating initially with beta-blockers and/or ACE inhibitors, with additional of other drugs as needed to achieve goal blood pressure. (Class I, LOE A)

Smith SC, Benjamin EJ, Bonow RO, et al. AHA/ACCF Secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic vascular disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation. *Circulation*. 2011; 58: 2342-2346.

## Post MI Interventions All Cause Mortality

Smoking cessation	NNT 15.6
Cardiac rehabilitation	NA
Intensive BP treatment	NNT 83

Prochaska JJ, Benowitz NL. Smoking cessation and the cardiovascular patient. *Curr Opin Cardiol*. 2015;305: 506-511.

## Poll Question 2

Mike is currently on a high-potency statin. You plan to recheck his LDL in 3 months. If his LDL-C is still greater than 70 mg/dL and you add ezetimibe to his statin, what benefit is it reasonable to expect from the added medication?

- A. Decreased all-cause mortality
- B. Decreased major cardiovascular events
- C. Increased adverse events
- D. No benefit has been proven from adding ezetimibe

## 2018 Cholesterol Guidelines

Secondary prevention

- Acute Coronary Syndrome
- Myocardial infarction
- Stable or unstable angina
- Arterial revascularization
- Peripheral artery disease

## 2018 Cholesterol Guidelines Secondary Prevention

Age < 75 years

- Start high-intensity statin
- If high-intensity statin not tolerated
  - Moderate-intensity statin
- If LDL-C  $\geq$  70 mg/dL
  - Consider ezetimibe

## 2018 Cholesterol Guidelines Secondary Prevention

Age > 75 years

- Starting moderate or high-intensity statin is reasonable
- Continuing high-intensity statin is reasonable

## Very-High Risk ASCVD

Multiple ASCVD events

- ACS within past 12 months
- Myocardial infarction
- Symptomatic Peripheral Artery Disease

## Very-High Risk ASCVD

Or one event and multiple high-risk conditions

- Age 65 years or older
- Heterozygous familial hypercholesterolemia
- Diabetes mellitus
- Hypertension
- Chronic kidney disease (GFR 15-59 mL/min)
- Current smoker
- LDL-C persistently > 100 mg/dL
- History of congestive heart failure

## Very-High Risk ASCVD

Multiple ASCVD events or one event and multiple high-risk conditions

- If on high-intensity statin and LDL-C  $\geq$  70 mg/dL
  - Consider adding ezetimibe
  - Add ezetimibe before PCSK9-I
- Adding PCSK9-I is reasonable for LDL-C  $\geq$  100 mg/dL or non-HDL-C  $\geq$  100 mg/dL

## High Intensity Statin Lowers LDL-C $\geq$ 50%

- Atorvastatin 80 mg
- Rosuvastatin 40mg

## Moderate-Intensity Statin Lowers LDL-C 30-49%

- Atorvastatin 10 mg
- Rosuvastatin 10mg
- Simvastatin 20-40mg
- Pravastatin 40mg
- Lovastatin 40mg
- Fluvastatin 40mg BID

## Cochrane Reviews

2018 Ezetimibe with statin

- Reduced MACE (ARR 1.7%, NNT 58.8)
- No effect on all-cause mortality
- No increase in adverse events

2018 PCSK9 Monoclonal antibodies

- Reduce LDL-C and decrease CVD risk
- No effect on all-cause mortality
- Increased risk of adverse events

# Lipid Recommendations

In patients who are 75 years of age or younger with clinical ASCVD, high-intensity statin therapy should be initiated or continued with the aim of achieving a 50% or greater reduction in LDL-C levels. (Class I, LOE A)

In patients with clinical ASCVD who are judged to be very high risk and considered for PCSK9 inhibitor therapy, maximally tolerated LDL-C lowering therapy should include maximally tolerated statin therapy and ezetimibe. (Class 1, LOE B)

Grundy SM, Stone NJ, Bailey AL, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APha/ASPC/NLA/PCNA guideline on the management of blood cholesterol: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol* 2019;73:e285–350.

## Post MI interventions All Cause Mortality

Smoking cessation	NNT 15.6
Cardiac rehabilitation	N/A
Intensive BP treatment	NNT 83
Statin	NNT 94
Ezetimibe + statin	N/A
PCSK9 monoclonal antibodies	N/A

Prochaska JJ, Benowitz NL. Smoking cessation and the cardiovascular patient. *Curr Opin Cardiol*. 2015;305: 506-511.

## Poll Question 3

Mike was prescribed aspirin and ticagrelor. His MI was treated with angiography and drug eluting stents. How long should Mike stay on both medications (dual antiplatelet therapy)?

- A. Minimum 14 days
- B. At least 1 month
- C. At least 6 months
- D. At least 12 months

## Antiplatelet Therapy

Dual antiplatelet therapy (Aspirin plus P2Y<sub>12</sub> Inhibitor)

- Aspirin continued indefinitely (75-100mg daily)
- P2Y<sub>12</sub> Continued 0-12 months or longer
  - Ticagrelor
  - Clopidogrel
  - Prasugrel

# Antiplatelet Therapy

## Dual antiplatelet therapy (DAPT)

- Aspirin plus P2Y<sub>12</sub> Inhibitor
  - Ticagrelor
  - Clopidogrel
  - Prasugrel

# Aspirin

Continued indefinitely for all patients with CAD

- Lower doses associated with less bleeding
- Higher doses do not reduce ischemic events
  - Can inhibit P2Y<sub>12</sub> inhibitors

Recommended daily dose 81 mg (75-100mg)

- Reduce risk of MI (NNT 77)
- Improve all cause mortality (NNT 333)

Antithrombotic Trialists Collaboration. Aspirin in the primary and secondary prevention of vascular disease: collaborative meta-analysis of individual participant data from randomized trials. *Lancet*. 2009;373: 19893-1860.

## DAPT

### Choice of agent

- Ticagrelor reasonable as first choice for ACS
- Prasugrel over clopidogrel for ACS and stents
  - Patients not at high risk for bleed
  - Patients without history of stroke or TIA
- Prasugrel contraindicated for history of stroke or TIA

## DAPT Length of Therapy

### Stable Ischemic Heart Disease (Clopidogrel)

- Medical management – no benefit (Class III)
- BMS – at least 1 month (Class I)
- DES – at least 6 months (Class I)
- CABG – at least 12 months (Class IIb)

## DAPT Length of Therapy

### Acute Coronary Syndrome

- Medical management – At least 12 months (Class I)
- Lytic – Minimum 14 days, preferably at least 12 months (Class I)
- PCI (BMS or DES) – at least 12 months (Class I)
- CABG – 12 months (Class I)

## DAPT Length of Therapy

### Extended length of DAPT

- Result on less ischemic events
- But more bleeding

Consider extended DAPT (Class IIb)

## DAPT Length of Therapy

### Extended length of DAPT

- Low ischemic risk and high bleeding risk
  - Shorter duration
- High ischemic risk and low bleeding risk
  - Longer duration

## DAPT Score

Age $\geq$ 75	-2
Age 65-75	-1
Age < 65	0
Current cigarette smoker	1
DM	1
MI at presentation	1
Prior PCI or prior MI	1
Stent diameter < 3 mm	1
Paclitaxel-eluting stent	1
CHF or EF < 30%	2
Saphenous vein graft PCI	2

## DAPT Score

Score  $\geq 2$

- Favors prolonged DAPT

Score  $< 2$

- Favors shorter course

## DAPT Recommendations

In patients with ACS (NSTE-ACS or STEMI) treated with DAPT after BMS or DES implantation, P2Y<sub>12</sub> inhibitor therapy (clopidogrel, prasugrel, ticagrelor) should be given for at least 12 months. (Class I, LOE B)

In patients with ACS treated with coronary stent implantation who have tolerated DAPT without a bleeding complication, and who are not at high bleeding risk, continuation of DAPT for longer than 12 months may be reasonable. (Class IIb, LOE B)

Levine G, bates ER, Bittle JA, et al. 2016 ACC/AHA guideline focused update on duration of dual antiplatelet therapy in patients with coronary artery disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. JACC. 2016; 68: 1082-1109.

## Post MI interventions All Cause Mortality

Smoking cessation	NNT 15.6
Cardiac rehabilitation	N/A
Intensive BP treatment	NNT 83
Statin	NNT 94
Ezetimibe + statin	N/A
PCSK9 monoclonal antibodies	N/A
Aspirin	NNT 333
Anti-platelet therapy	NNT 153

## Poll Question 4

Mike is also taking metoprolol succinate. He give you a copy of his post-MI echocardiogram report, which shows a normal ejection fraction. How long should you continue the beta blocker?

- A. At least 14 days
- B. At least 12 months
- C. 3 years
- D. 3 years and continuing indefinitely is reasonable

## Beta Blockade

- In patients with previous MI
  - Reduce mortality NNT 42
  - Reduce reinfarction NNT 107
- Recommended agents
  - Carvedilol
  - Metoprolol succinate
  - Bisoprolol
- Continue for at least 3 years
  - Indefinitely if LVEF < 40%

## Beta Blockade How long to continue?

- Original studies were pre-revascularization
  - Showed improved mortality
  - Decreased infarct size
- Modern studies in the vascularization age show conflicting results
  - Evidence of short-term benefits
  - Long term benefit less clear

Bockstall K. How long should we continue beta-blockers after MI? 2017. <https://www.acc.org/latest-in-cardiology/articles/2017/01/20/09/36/how-long-should-we-continue-beta-blockers-after-mi>. Accessed July 2019.

# Beta Blocker Recommendations

Beta-blocker therapy should be used in all patients with left ventricular systolic dysfunction (ejection fraction  $\leq 40\%$ ) with heart failure or prior myocardial infarction, unless contraindicated. (Use should be limited to carvedilol, metoprolol succinate, or bisoprolol, which have been shown to reduce mortality) . (Class I, LOE A)

Beta-blocker therapy should be started and continued for 3 years in all patients with normal left ventricular function who have had myocardial infarction. (Class I, LOE B)

It is reasonable to continue beta-blockers beyond 3 years as chronic therapy in all patients with normal left ventricular function who have had myocardial infarction or ACS. (Class I, LOE B)

Smith SC, Benjamin EJ, Bonow RO, et al. AHA/ACC Secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic vascular disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation. *Circulation*. 2011; 58: 2342-2346.

## Post MI interventions All Cause Mortality

Smoking cessation	NNT 15.6
Cardiac rehabilitation	N/A
Intensive BP treatment	NNT 83
Statin	NNT 94
Ezetemibe + statin	N/A
PCSK9 monoclonal antibodies	N/A
Aspirin	NNT 333
Anti-platelet therapy	NNT 153
Beta blockade	NNT 42

## Case 1 Continued

Mike returns to your office 3 months later. Despite taking all of the medications you prescribed, he still has substernal chest pain that is brought on by exercise and relieved by rest. This pain is very similar to the chest pain he had in the months prior to his heart attack. He is worried that he might be having another heart attack. When asked, he answers he has not been taking the nitroglycerin you prescribed him.

## Angina after a MI

Is this stable angina or unstable angina?

Unstable angina

- New onset
- Increasing in intensity
- Occurs with rest
- Troponin negative

## Angina after a MI

Pharmacological management

- Sublingual nitroglycerin (immediate relief)
- Beta blockers (long-term relief)

## Angina after a MI

If the patient still has angina... consider adding:

- Calcium channel blocker
- Long-acting nitrate
- Ranolazine

If still symptomatic... consider angiography and possible revascularization

## Angina after a MI

What if you think the patient is having a repeat MI?

- ECG
- Troponin
- If negative, consider stress imaging
  - Stress echocardiography
  - Nuclear myocardial perfusion

## Practice Recommendations

- Every tobacco user should be advised to quit at every visit. (Class IA)
- Patients with blood pressure  $\geq 140/90$  mm Hg should be treated, as tolerated, with blood pressure medication, treating initially with beta-blockers and/or ACE inhibitors, with additional of other drugs as needed to achieve goal blood pressure. (Class I, LOE A)
- In patients with ACS (NSTE-ACS or STEMI) treated with DAPT after BMS or DES implantation, P2Y<sub>12</sub> inhibitor therapy (clopidogrel, prasugrel, ticagrelor) should be given for at least 12 months. (Class I, LOE B)

## Contact Information

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## Questions



## Additional Reading

- Smith SC, Benjamin EJ, Bonow RO, et al. AHA/ACCF Secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic vascular disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation. *Circulation*. 2011; 58: 2342-2346.
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