BOSTON MEDICAL CENTER
ACUTE CORONARY SYNDROME MANAGEMENT GUIDE

STEMI ALGORITHM

Page BMC Interventional Beeper (617) 638-5795 pager 7822

Aspirin
Nitrates/ Beta Blocker
UFH
***Clopidogrel**

PRIMARY INVASIVE
-Cath Lab with door to balloon inflation
<90 minutes

FIBRINOLYTIC
No PCI available within 90 minutes
- t-PA within 30 min

NOT REPERFUSION CANDIDATE

-Medical Management

Reperfusion Failure
Yes
-Is patient candidate Rescue Angioplasty?
Yes
Call BMC Interventional Beeper (617) 638-5795 pager 7822

UA/NSTEMI ALGORITHM

INITIAL THERAPY
Aspirin
Nitrates
Beta Blockers
LMWH / UFH
***Clopidogrel**
Call Cardiology high risk features

ANY HIGH RISK FEATURE
-Positive Troponin
-Recurrent ischemia
-Dynamic EKG changes
-TIMI≥3
-LVEF< 40%
-Hemodynamic Compromise

INVASIVE STRATEGY

-Consider GPIIbIIIa Inhibitor
-Coronary Angiography

LOW RISK
Absent high risk features
Benign noninvasive tests

CONSERVATIVE STRATEGY:

At MD and Patient Discretion

***TIMI RISK SCORE UA/NSTEMI (Assign each feature 1 point)**

- *Age ≥65*
- *≥3 CAD risk factors*
- *≥2 angina events 24 hrs*
- *CAD with ≥ 50% stenosis*
- *ASA in 7 days*
- *ST deviation*
- *Elevated cardiac markers*

0-2pts: Low Risk ACS ***3-4pts: Intermediate Risk ACS*** ***5-7pts: High Risk ACS***

* See Guidelines on Card

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0-2pts: Low Risk ACS 3-4pts: Intermediate Risk ACS 5-7pts: High Risk ACS

* See Guidelines on Card

ADMIT TO ACS PATHWAY

ASPIRIN:

ADM ALL ACS: Chewable ASA 162 mg to 325 mg (IA). If true allergy, substitute clopidogrel 300 mg to 600 mg loading dose po on admission then clopidogrel 75 mg po daily indefinitely. (IA)

ACS DRUG ELUTING STENT (DES) : ECASA 162 mg -325 mg po daily in sirolimus (Cypher) stent for 3 mo and in paclitaxel (Taxus) stent or zotarolimus (Endeavor) stent 6 mo (IB) then ECASA 81 mg po daily continued indefinitely. (1A)

ACS BARE METAL STENT OR PTCA: ECASA 162 mg-325 mg po daily for 1 mo (IB)) then ECASA 81 mg po daily continued indefinitely. (1B)

ACS HIGH BLEEDING RISK POST STENT IMPLANTATION: A lower dose of aspirin 81 mg-162 mg is reasonable during the initial period after stent implantation in patients at high bleeding risk.(IIa)

ACS NO REVASCULARIZATION: ECASA 81mg po daily continued indefinitely (1A)

BMC ASA CAVEAT: (1) 325 mg and 81 mg are the doses most used at BMC .

CLOPIDOGREL:

ADM UA/NSTEMI/STEMI INVASIVE PCI STRATEGY LIKELY: A loading dose of clopidogrel 300 mg-to 600 mgs po should be administered before or when PCI performed. (IA)

STEMI WITH FIBRINOLYTIC OR CONSERVATIVE MANAGMENT :Clopidogrel 75 mg po should be added to aspirin and continue for at least 14 days (IB). Long term maintenance (e.g.1 yr) with clopidogrel 75 mgs daily is reasonable in all STEMI patients undergoing reperfusion with fibrinolytic or no reperfusion therapy. (IIa)

UA/NSTEMI CONSERVATIVE NONINVASIVE STRATEGY: Clopidogrel 300 mg oral dose followed by 75 mg po daily maintenance dose should be used as soon as possible and administered at least 1 mo (IA) and ideally up to 1 year. (IB)

DRUG ELUTING STENT (DES) Clopidogrel 75 mg po daily for at least 12 months if patients not at high risk of bleeding . (IB) If high bleeding risk, 3 mo minimum (Cypher) stent and 6 mo mininmum paclitaxel (Taxus) stent or zotarolimus (Endeavor) stent.

NON DRUG ELUTING STENT (BMS): Clopidogrel 75mg po daily for a minimum of 1 mo. Ideally up to 12 months unless patient at high risk of bleeding then it should be given for a minimum of 2 weeks.(IB)

BMC CLOPIDOGREL CAVEAT: (1) Clopidogrel should not be initiated when the likelihood of surgical disease requiring CABG is high.. *(2) In patients taking clopidogrel in for whom CABG is planned , clopidogrel should be stopped for at least 5 days (IB)*

ENOXAPARIN:

ADM UA/NSTEMI: Enoxaparin 1 mg SC q12 hr provided CrCl≥ 30ml /min or 1 mg every 24 hrs when CrCl < 30 ml/min up to time of catheterization (IA) or up to 8 days when noninvasive strategy used .(IB) Enoxaparin 30 mg IV bolus may be given 15 minutes prior to first dose as a loading dose.

STEMI FOLLOWING FIBRINOLYTIC THERAPY ≤ 75 YRS OF AGE: Provided CrCl ≥ 30ml/min, enoxaparin 1 mg/kg SC every 12 hours . (IA) If CrCl<30 ml/min enoxaparin is dosed at 1 mg/kg once a day up to 8 days. Enoxaparin 30 mg IV bolus may be given 15 minutes prior to first dose as a loading dose.

STEMI FOLLOWING FIBRINOLYTIC THERAPY >75 YRS OF AGE: Provided Cr CrCl ≥ 30 ml/min give enoxaparin 0.75mg/kg SC every 12 hrs for up to 8 days. (IA) No IV bolus loading dose should be given.

STEMI WITH NO REPERFUSION THERAPY : Enoxaparin as outlined in fibrinolytic therapy may be used for up to 8 days. (IIa)

ACS WHEN BRIDGING TO COUMADIN FOR AF, LV THROMBUS, LVEF ≤35% WITH APICAL AKINESIS, MECHANICAL OR TISSUE HEART VALVE, : For patients requiring warfarin, clopidogrel and aspirin therapy, an INR of 2.0-2.5 is recommended (IC) except when higher INR needed for mechanical heart valve. Enoxaparin bridging may be used until the INR is therapeutic.

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BMC ENOXAPARIN CAVEATS: *(1) Enoxaparin is the preferred agent in UA/NSTEMI patients except when Cath/PCI planned within 6 hrs or CABG planned within 24 hrs and in STEMI patients post fibrinolysis (2) Enoxaparin should not be used in patients post device implants such as ICD and pacemakers because of risk for device pocket hematoma .(3) Enoxaparin should be stopped 12 hrs before CABG surgery , ETT or discharge from hospital when dosed every 12 hrs. When enoxaparin is renally dosed , it should be stopped 24 hrs prior to CABG , ETT or discharge .*

UNFRACTIONATED HEPARIN:

ADM ALL STEMI INVASIVE STRATEGY : UFH 60 u/kg bolus (max 4000 units) followed by 12 units/kg/hr (max 1000 units/hr) continued to time of cath. (IC)

ADM STEMI FOLLOWING FIBRINOLYTIC THERAPY : UFH 60u/kg bolus (max 4000 units) followed by 12 units/kg/hr (max 1000 units/hr) continued 48 hrs. (IC) Enoxaparin is preferred.

ADM UA/NSTEMI WITH PLANNED INVASIVE STRATEGY < 6HRS FROM ADM: UFH 60 u/kg bolus (max 4000 units) followed by 12 units/kg/hr (max 1000 units/hr) for 48 hrs or to time of cath. (IC)

ACS AT HIGH RISK EMBOLIC EVENT: When using UFH for bridging an ACS patient at high risk for an embolic event to warfarin, UFH should not be dosed greater than 12 units/kg/hr.

BMC HEPARIN CAVEATS: (1) UFH is preferred in all patients when Cath is planned within 6 hrs ,CABG planned within 24 hrs and following pacemaker/ICD placement when anticoagulation is required. (2) UFH should be used when weight >150 kg and for anuric or hemodialysis patients. (3) UFH should be stopped for ≥ 4 hrs before CABG surgery, ETT or discharge from the hospital. .(4) Platelets should be checked daily while on UFH.

BIVALIRUDIN

ADM ACS CONTRAINDICATIONS TO USE OF UFH AND LMWH: In setting of suspected Heparin Induced Thrombocytpenia , Bivalirudin 0.1 mg/kg IV bolus followed by 0.25 mg/kg/hr infusion should be used as a direct thrombin inhibitor . (IB)

BMC BIVALIRUDIN CAVEAT: *Bivalirudin is reserved for patients with HIT or use by Interventional Service during PCI .*

GPIIbIIIa INHIBITOR:

UA/NSTEMI PATIENTS INVASIVE STRATEGY PLANNED + HIGH RISK FEATURES + POSITIVE TROPONIN : Either a GPIIbIIIa Inhibitor or Clopidogrel should be started when this criteria is met. (IA) Alternatively GPIIbIIIa Inhibitor may be added to Clopidogrel. (IIa)

-BMC's Preferred GPIIbIIIa is eptifibatide 180 mcg/kg IV bolus followed by 2 mcg/kg/min infusion. For CrCl<50ml/min, use same bolus but decrease infusion to 1 mcg/kg/min. Eptifibatide is contraindicated in dialysis patients .

-For Patients Transferred on tirofiban , maintenance infusion is 0.1 mcg/kg/min . If CrCl<30ml/min, decrease infusion to 0.05 mcg/kg/min.

BMC GPIIbIIIa INHIBITOR CAVEATS: *(1) Factors favoring adding a GPIIbIIIa inhibitor to clopidgrel include delay to angiography, TIMI Score ≥ 3 and recurrent ischemic discomfort . (2) Check platelet count 4 hr after the initiation of GPIIbIIIa inhibitor and then daily .If platelet count decreases by 25% or is <100,000 consider stopping GPIIbIIIa inhibitor in consultation with Interventional Service . (4) When stopping a GPIIbIIIa Inhibitor on day of discharge observe patient at least 3 hr following its discontinuation ..*

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THROMBOLYTIC:

STEMI UNABLE TO UNDERGO PCI WITHIN 90 MINUTES FROM FIRST HOSPITAL CONTACT TREAT WITH FIBRINOLYTIC THERAPY WITHIN 30 MINUTES OF HOSPITAL ARRIVAL (IB)

-BMC'S Preferred Fibrinolytic is Alteplase (t-PA) given as 100mg over 90 minutes per following protocol

If ≥ 67 kg: 15 mg IV Bolus followed by 50mg IV over first 30 minutes then, 35 mg infusion over next 60 minutes

If < 67 kg: 15 mg IV Bolus followed by 0.75 mg/kg (max 50 mg) over first 30 minutes then 0.50 mg/kg (max 35mg)

BMC THROMBOLYTIC CAVEAT: (1) Use anticoagulation post thrombolysis for a minimum of 48 hr *(2) Enoxaparin appears superior to UFH when fibrinolytic therapy has been used .*

NITRATES:

ADM ALL ACS WITH PERSISTENT CHEST PAIN (Provided SBP>90mmHg, HR>50 but <100/min and without evidence of a RV infarct): Nitroglycerin 0.4mg sl every 5 minutes up to 3 doses after which assess the need for IV Nitro. (IC)

FIRST 24 HR ALL ACS WITH ACTIVE ISCHEMIA, HTN OR HF

Initiate IV Nitroglycerin at 10-20 mcg/min titrating every 3 to 5 minutes until pain free provided SBP ≥ 90 mmHg .(IB)

AFTER 24 HR ALL ACS WITH CONTINUING ISCHEMIA HEART FAILURE, OR UNREVACULARIZED TERRITORY: Consider long term nitrate therapy starting with isosorbide dinitrate 10 mg po three times a day. IB)

Provide nitrate free period. Uptitrate as required. Transition to equivalent once a day isosorbide mononitrate dose predischarge.

ALL ACS AT DISCHARGE: Nitroglycerin 0.4 mg SL with chest discomfort .If unimproved or worsening after 5 minutes instruct to call 911.While activating 911, may take additional nitroglycerin 0.4 mg SL at 5 minute interval up to 2 times if discomfort persist while waiting for EMS .(IC)

BMC NITRATE CAVEAT: *Nitrates should not preclude therapy with beta blockers or ACEI which have known mortality benefit.(IB)*

BETA BLOCKERS:

ADM ALL STEMI/NSTEMI WITHIN FIRST 24 HRS : Give short acting metoprolol 12.5-25 mg po every 8 hr if new to beta blocker therapy or every 12 hrs if on prior beta blocker therapy. Titrate beta blocker to achieve a HR 50-60 min and BP<130/80 at discharge for patients with diabetes, renal insufficiency and heart failure otherwise target BP< 140/90. (IB) **Contraindication MUST BE documented in patient's chart**

ALL ACS PATIENTS : It is beneficial to continue beta blocker therapy indefinitely in all patients who have had MI, ACS , or LV dysfunction with or without HF symptoms unless specific contraindication. (IA) **Contraindication MUST BE documented in patient's chart e.g significant bradycardia/ heart block, significant heart failure, inhaler dependent or active brochospastic disease, hypotension .**

BMC BETA BLOCKER CAVEAT : (1) In the presence of cardiogenic shock or overt HF, a Beta Blockers should not be initiated*. (2) To determine equivalent once daily discharge dose, metoprolol 100 mg every 12 hrs would be equivalent to toprol XL 200 mg daily or atenolol 100 mg once daily (3) Beta Blockers should be used cautiously in setting of recent cocaine use. (4) Carvedilol is the preferred beta blocker in STEMI when LVEF≤ 40% .It should* ***started*** *at 3.125 mg every 12 hrs.*

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CALCIUM CHANNEL BLOCKERS :

ACS WHEN BETA BLOCKERS ARE CONTRAINDICATED AND CONTINUING ISCHEMIA, HTN OR TACHYCARDIA: Diltiazem 30-60mg po q6hrs or Verapamil 40-80 mg po q8hr provided LVEF>40%, there is no clinical heart failure, HR is ≥ 60, and there is no evidence of heart block . (IB)

BMC CALCIUM CHANNEL BLOCKER CAVEAT: *Transition to a once a day dosing prior to discharge.*

ANGIOTENSIN CONVERTING ENZYME INHIBITOR (ACEI):

ALL ACS PATIENTS WITH CLINICAL OR RADIOGRAPHIC SIGNS OF CHF OR LVEF ≤ 40% WITHIN 24 HR OF ADMISSION : Captopril 6.25 mg po X1 dose. If 8hr later SBP>90mmHg, uptitrate captopril to 12.5 mg po every 8hr. Continue to uptitrate as tolerated with goal of maximizing dose .(IA) Transition to once a day agent lisinopril, enalapril, or ramipril 24hr predischarge.

ALL ACS PATIENTS WITH HF, LV DYSFUNCTION (LVEF ≤ 40%), HTN OR DIABETES MELLITUS AT DISCHARGE : Initiate a long acting ACEI pre-discharge and continue indefinitely unless there is a specific contraindication. (IA)

Contraindication MUST BE documented in **patient's chart if not used eg angioedema, hypotension, renal insufficiency, hyperkalemia, aortic stenosis .**

BMC ACEI CAVEAT: (1) If ACEI intolerant due to cough, an Angiotensin Receptor Blocker (ARB) should be used in place of ACEI for patients with LVEF ≤40%.(IA) *(2) Target dose in clinical trial in HF was up to Lisinopril 40 mgs or its equivalent which may require additional outpatient titration..*

ANGIOTENSIN RECEPTOR BLOCKER (ARB):

ALL ACS PATIENTS INTOLERANT OF ACEI WHO HAVE CLINICAL OR RADIOLOGIC SIGNS OF HF OR LVEF ≤ 40%: Valsartan 40 mg po twice a day or losartan 25 mg po once a day. (IA) Uptitrate as tolerated.

BMC ARB Caveat: *(1) ARB is particularly useful when ACEI intolerant due to cough. (2) If true ACEI angioedema , ARB is generally not recommended.. (3) Target ARB dose in clinical trials in HF was valsartan 160 mg po twice a day or losartan 100 mg once a day which may require additional outpatient titration.*

ALDOSTERONE BLOCKADE:

STEMI WITHOUT SIGNIFICANT RENAL DYSFUNCTION OR HYPERKALEMIA WHO ARE ALREADY RECEIVING THEREPEUTIC DOSES OF AN ACEI AND BETA BLOCKER AND WHO HAVE AN LVEF ≤ 40% AND HAVE EITHER DIABETES OR OVERT HF: Eplerenone 25 mg po daily (IA) . Alterntatively spironolactone 25 mg once daily may be used.

BMC ALDOSTERONE BLOCKADE CAVEAT: *(1) Cr Cl should be > 30 ml/min . (2) K should be < than 5 mg/dL .(3) Use with extreme caution in elderly, diabetics and women .(4) Schedule Cr and K check post discharge.*

LIPID LOWERING THERAPY:

ALL ACS PATIENTS WITH LDL-C ≥100 MG /DL (IA) OR LDL-C≥ 70 MG /DL (IIa) : Should be given a statin unless contraindicated .T There are two alternative management styles

(1)Statin dose based on the percent LDL reduction needed to achieve desired LDL

or

(2)Atorvastatin 80 mg po daily

Formula for LDL=T CHOL– HDL- (Triglycerides/5)

CALCIUM CHANNEL BLOCKERS :

ACS WHEN BETA BLOCKERS ARE CONTRAINDICATED AND CONTINUING ISCHEMIA, HTN OR TACHYCARDIA: Diltiazem 30-60mg po q6hrs or Verapamil 40-80 mg po q8hr provided LVEF>40%, there is no clinical heart failure, HR is ≥ 60, and there is no evidence of heart block . (IB)

BMC CALCIUM CHANNEL BLOCKER CAVEAT: *Transition to a once a day dosing prior to discharge.*

ANGIOTENSIN CONVERTING ENZYME INHIBITOR (ACEI):

ALL ACS PATIENTS WITH CLINICAL OR RADIOGRAPHIC SIGNS OF CHF OR LVEF ≤ 40% WITHIN 24 HR OF ADMISSION : Captopril 6.25 mg po X1 dose. If 8hr later SBP>90mmHg, uptitrate captopril to 12.5 mg po every 8hr. Continue to uptitrate as tolerated with goal of maximizing dose .(IA) Transition to once a day agent lisinopril, enalapril, or ramipril 24hr predischarge.

ALL ACS PATIENTS WITH HF, LV DYSFUNCTION (LVEF ≤ 40%), HTN OR DIABETES MELLITUS AT DISCHARGE : Initiate a long acting ACEI pre-discharge and continue indefinitely unless there is a specific contraindication. (IA)

Contraindication MUST BE documented in **patient's chart if not used eg angioedema, hypotension, renal insufficiency, hyperkalemia, aortic stenosis .**

BMC ACEI CAVEAT: (1) If ACEI intolerant due to cough, an Angiotensin Receptor Blocker (ARB) should be used in place of ACEI for patients with LVEF ≤40%.(IA) *(2) Target dose in clinical trial in HF was up to Lisinopril 40 mgs or its equivalent which may require additional outpatient titration..*

ANGIOTENSIN RECEPTOR BLOCKER (ARB):

ALL ACS PATIENTS INTOLERANT OF ACEI WHO HAVE CLINICAL OR RADIOLOGIC SIGNS OF HF OR LVEF ≤ 40%: Valsartan 40 mg po twice a day or losartan 25 mg po once a day. (IA) Uptitrate as tolerated.

BMC ARB Caveat: *(1) ARB is particularly useful when ACEI intolerant due to cough. (2) If true ACEI angioedema , ARB is generally not recommended.. (3) Target ARB dose in clinical trials in HF was valsartan 160 mg po twice a day or losartan 100 mg once a day which may require additional outpatient titration.*

ALDOSTERONE BLOCKADE:

STEMI WITHOUT SIGNIFICANT RENAL DYSFUNCTION OR HYPERKALEMIA WHO ARE ALREADY RECEIVING THEREPEUTIC DOSES OF AN ACEI AND BETA BLOCKER AND WHO HAVE AN LVEF ≤ 40% AND HAVE EITHER DIABETES OR OVERT HF: Eplerenone 25 mg po daily (IA) . Alterntatively spironolactone 25 mg once daily may be used.

BMC ALDOSTERONE BLOCKADE CAVEAT: *(1) Cr Cl should be > 30 ml/min . (2) K should be < than 5 mg/dL .(3) Use with extreme caution in elderly, diabetics and women .(4) Schedule Cr and K check post discharge.*

LIPID LOWERING THERAPY:

ALL ACS PATIENTS WITH LDL-C ≥100 MG /DL (IA) OR LDL-C≥ 70 MG /DL (IIa) : Should be given a statin unless contraindicated .T There are two alternative management styles

(1)Statin dose based on the percent LDL reduction needed to achieve desired LDL

or

(2)Atorvastatin 80 mg po daily

Formula for LDL=T CHOL– HDL- (Triglycerides/5)

TARGETED STATIN THERAPY FOR GOAL LDL<70 mg/dL

LDL VALUE	% REDUCTION NEEDED	AGENT SELECTION *((talic Agents on BMC FORMULARY/Red preferred*
≥180mg/dl	≥60%	***Atorvastatin 80mg*** ***Ezetimibe/Simvastatin 10/80mg*** Rosuvastatin 40 mg
140-180mg/dl	50-60%	***Atorvastatin 80mg*** ***Ezetimibe/Simvastatin 10-40mg*** Rosuvastatin 40mg
120-140mg/dl	40-50%	***Simvastatin 80mg*** Ezetimibe/Simvastatin 10/20mg Atorvastatin 40mg Rosuvastatin 20mg
100-120mg/dl	30-40%	***Simvastatin 40mg*** ***Pravastatin 80mg*** Atorvastatin 20mg, Rosuvastatin 10mg. Lovastatin 80mg
70-100mg/dl	<30%	***Simvastatin 10-20mg*** ***Pravastatin 20-40mg*** Atorvastatin 5-10mg Rosuvastatin 5mg. Lovastatin 20-40mg

1)Ezetimibe 10mg added to any statin provides an additional 15-20% decrease LDL .
2) Pravastatin is preferred whenever there is concern with CYP 450 interactions i.e. HIV therapy or immunosuppression post organ transplant

ACS WITH TRIGLYCERIDES ≥ 500 MG/DL: Use fibrate or niacin BEFORE initiating LDL lowering therapy. Once triglycerides is lowered add statin.(IC)
BMC formulary agent gemfibrozil 600mg po twice a day.

ACS WITH HDL<40 MG/DL AND LDL<70 MG/DL: Niacin or fibrates can be useful therapeutic options for HDL ≤ 40mg/dL (IIa) when nonpharmacolgical alternatives such as cigarette smoking cessation fail.

BMC CAVEAT COMBINATION STATIN/FIBRATE: ***(1)*** *Risk of severe myopathy is increased when combining statin and fibrate .(2) Fenofibrate is safer than gemfibrozil when combined with statin and should be considered when discharging patient .*

WARFARIN

ACS WITH OTHER INDICATIONS FOR ANTICOAGULATION (eg AF, LV THROMBUS, MECHANICAL HEART VALVE, VTE) : Begin warfarin where once invasive procedures completed. In patients on concomitant aspirin and clopidogrel therapy, an INR of 2.0-2.5 .SEE SPECIFIC ASA AND CLOPIDOGREL DOSING GUIDELINES FOR PATIENTS AT HIGH RISK OF BLEEDING

BMC WARFARIN CAVEAT: ***(1)*** *Start warfarin at 5 mg except in the elderly, or patients with liver disease, heart failure or on significant interacting medications such as amiodarone where a 2.5 mg dose should be used. (2) Discharge Summary should have detailed anticoagulation plan under Outstanding Issues.*

INFLUENZA VACCINE:

All ACS PATIENTS : Should receive annual influenza vaccine during flu season .(IB)

TARGETED STATIN THERAPY FOR GOAL LDL<70 mg/dL

LDL VALUE	% REDUCTION NEEDED	AGENT SELECTION *((talic Agents on BMC FORMULARY/Red preferred*
≥180mg/dl	≥60%	***Atorvastatin 80mg*** ***Ezetimibe/Simvastatin 10/80mg*** Rosuvastatin 40 mg
140-180mg/dl	50-60%	***Atorvastatin 80mg*** ***Ezetimibe/Simvastatin 10-40mg*** Rosuvastatin 40mg
120-140mg/dl	40-50%	***Simvastatin 80mg*** Ezetimibe/Simvastatin 10/20mg Atorvastatin 40mg Rosuvastatin 20mg
100-120mg/dl	30-40%	***Simvastatin 40mg*** ***Pravastatin 80mg*** Atorvastatin 20mg, Rosuvastatin 10mg. Lovastatin 80mg
70-100mg/dl	<30%	***Simvastatin 10-20mg*** ***Pravastatin 20-40mg*** Atorvastatin 5-10mg Rosuvastatin 5mg. Lovastatin 20-40mg

1)Ezetimibe 10mg added to any statin provides an additional 15-20% decrease LDL .
2) Pravastatin is preferred whenever there is concern with CYP 450 interactions i.e. HIV therapy or immunosuppression post organ transplant

ACS WITH TRIGLYCERIDES ≥ 500 MG/DL: Use fibrate or niacin BEFORE initiating LDL lowering therapy. Once triglycerides is lowered add statin.(IC)
BMC formulary agent gemfibrozil 600mg po twice a day.

ACS WITH HDL<40 MG/DL AND LDL<70 MG/DL: Niacin or fibrates can be useful therapeutic options for HDL ≤ 40mg/dL (IIa) when nonpharmacolgical alternatives such as cigarette smoking cessation fail.

BMC CAVEAT COMBINATION STATIN/FIBRATE: ***(1)*** *Risk of severe myopathy is increased when combining statin and fibrate .(2) Fenofibrate is safer than gemfibrozil when combined with statin and should be considered when discharging patient .*

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ACS WITH OTHER INDICATIONS FOR ANTICOAGULATION (eg AF, LV THROMBUS, MECHANICAL HEART VALVE, VTE) : Begin warfarin where once invasive procedures completed. In patients on concomitant aspirin and clopidogrel therapy, an INR of 2.0-2.5 .SEE SPECIFIC ASA AND CLOPIDOGREL DOSING GUIDELINES FOR PATIENTS AT HIGH RISK OF BLEEDING

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INFLUENZA VACCINE:

All ACS PATIENTS : Should receive annual influenza vaccine during flu season .(IB)

SYSTOLIC HEART FAILURE
ADMIT TO HEART FAILURE PATHWAY

ACUTELY DECOMPENSATED CHF ALGORITHM

(Volume Overload, Dyspnea, Hypoxia)

Administer High flow NRB or BIPAP
If O2 Sats remain <92% consider need for intubation

SBP>90mmHg
IV diuretic
Reassess within 60 min and if urine output <500cc double the dose.

Treat HTN if present with PO/Topical/IV vasodilator.

SBP<90mmHg S/S Hypoperfusion

Consider Inotopic IV Agent *(Dopamine / Dobutamine)* in addition to IV diuretics.

Cardiomyopathy/Cardiology consult
Consider PA Line.

Failure to Respond
Consult Cardiomyopathy Fellow

USE HEART FAILURE ORDER SET

HEART FAILURE ACUTE PHASE MANAGEMENT

IV DIURETICS:
VOLUME OVERLOAD: If on furosemide at home, take their home po dose and give this same dose intravenously. If not on a diuretic, give furosemide 40 mg IV as starting dose. (IC)
BMC FUROSEMIDE CAVEAT: *If urine output <500cc at 60 minutes, double the IV dose and readminister at this higher dose.*
DIURETIC RESISTANCE: (1) Metolazone 2.5 to 5 mg po administered 30 minutes prior to an IV or PO Loop diuretic or (2) Change to furosemide infusion at 10-40 mg/ hr guided by the SCr.
BMC METOLAZONE CAVEATS: *(1) Metolazone is usually only administered with first dose of the day or on alternate days. (2) Monitor serum electrolytes and renal function closely as significant Na, K and Mg losses may occur. Consider BID labs. Keep K.≥4.0 meq/l and Mg>2.0 meq/l . (3) May see deterioration in renal function with metolazone and loop diuretic combination.*

SYSTOLIC HEART FAILURE
ADMIT TO HEART FAILURE PATHWAY

ACUTELY DECOMPENSATED CHF ALGORITHM

(Volume Overload, Dyspnea, Hypoxia)

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SBP<90mmHg S/S Hypoperfusion

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Cardiomyopathy/Cardiology consult
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HEART FAILURE ACUTE PHASE MANAGEMENT

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IV MORPHINE SULFATE:
FOR ACUTE PRELOAD REDUCTION ESPECIALLY WHEN THERE IS ASSOCIATED RESTLESSNESS AND DYSPNEA: Morphine sulfate 2-4 mg IV boluses every 5 minutes provided SBP>100mmHg and RR>10 . (IIb)

VASODILATORS:
FOR PRELOAD AND/OR AFTERLOAD REDUCTION:
-WHEN THERE IS CONCURRENT ISCHEMIA: Topical or intravenous nitrates are preferred. (IB) If using topically, apply Nitroglycerin 2% with 1 inch every 6 hr. Allow for nitrate free period. May increase in 0.5 inch increments up to 2 inches as tolerated by BP. For rapid preload reduction, Nitroglycerin infusion starting at 20 mcg/min increasing every 3-5 minutes in 10-20 mcg/min increments may be initiated on designated Telemetry Units (N6N, N7N, Menino 5W Tele) and Critical Care areas at BMC. Infusions requiring titration beyond 15 to 30 minutes or that exceed 100 mcg/min require transfer to a critical care unit.
BMC CAVEAT IV NITROGLYCERIN: *Doses >100 mcg/min cause vasodilatation of arterial system reducing afterload, SVR and SBP.*
-WHEN CONCURRENT HYPERTENSION AND ELEVATED SYSTEMIC VASCULAR RESISTANCE: Sodium Nitroprusside infusion (IC) starting at 0.25-0.5 mcg/kg/min increasing slowly up to 5mcg/kg/min may be given in Critical Care areas at BMC.
BMC CAVEAT SNP: *(1)Prolonged SNP administration may be associated with toxicity from metabolites of thiocyanate and should be avoided especially in patients with severe renal or hepatic failure . (2) Use cautiously in presence of ischemic heart disease.*
-FOR VASODILATION WITH NATRUIRESIS IN DECOMPENSATED HEART FAILURE: Nesiritide 2mcg/kg bolus followed by 0.01 mcg/kg/min infusion may be given in designated Telemetry units of BMC if followed by the Cardiomyopathy Service and may be given in all Critical Care areas of BMC. Currently there is no designated AHA/ACC recommendation for Nesiritide in heart failure.

INOTROPIC AGENTS:
PERIPHERAL HYPOPERFUSION WITH OR WITHOUT PULMONARY CONGESTION OR PULMONARY EDEMA REFRACTORY TO DIURETICS WITH VASODILATORS AT OPTIMAL DOSES:
-**Dobutamine** initiated at 2.5-5.0 mcg/kg/min may be given in designated Telemetry areas of BMC with a Cardiology consult. Higher doses require a Critical Care Unit at BMC. Dobutamine up to 20 mcg/kg/min may be administered. (IIa)
-Dopamine at ≤2-3mcg/kg/min may be used on designated Telemetry areas of BMC to improve renal blood flow and diuresis in decompensated heart failure with hypotension and low urine output. It may be increased in these areas up to 5 mcg/kg/min to give moderate inotropic support. Doses higher than 5mcg/kg/min require a Critical Care Unit at BMC. (IIb)
-Milrinone 50mcg/kg bolus over 20 minutes then 0.25 mcg/kg/min is reserved for patients in Critical Care Unit. It has significant inotropic effect. It causes peripheral vasodilatation further reducing afterload improving forward flow. Its infusion requires that patient have adequate systemic BP and filling pressures before initiating. May be preferred to dobutamine for patients on concomitant beta blocker therapy and/or an inadequate response to dobutamine. (IIb)

ANTICOAGULATION DVT PROPHYLAXIS FOR SYSTOLIC HEART FAILURE :
Enoxaparin 40mg sc once a day or UFH 5000 units sc three times a day.(IA)
BMC DVT CAVEAT: *For CrCl< 30 ml /min Enoxaparin 30 mg every 24 hrs*

IV MORPHINE SULFATE:
FOR ACUTE PRELOAD REDUCTION ESPECIALLY WHEN THERE IS ASSOCIATED RESTLESSNESS AND DYSPNEA: Morphine sulfate 2-4 mg IV boluses every 5 minutes provided SBP>100mmHg and RR>10 . (IIb)

VASODILATORS:
FOR PRELOAD AND/OR AFTERLOAD REDUCTION:
-WHEN THERE IS CONCURRENT ISCHEMIA: Topical or intravenous nitrates are preferred. (IB) If using topically, apply Nitroglycerin 2% with 1 inch every 6 hr. Allow for nitrate free period. May increase in 0.5 inch increments up to 2 inches as tolerated by BP. For rapid preload reduction, Nitroglycerin infusion starting at 20 mcg/min increasing every 3-5 minutes in 10-20 mcg/min increments may be initiated on designated Telemetry Units (N6N, N7N, Menino 5W Tele) and Critical Care areas at BMC. Infusions requiring titration beyond 15 to 30 minutes or that exceed 100 mcg/min require transfer to a critical care unit.
BMC CAVEAT IV NITROGLYCERIN: *Doses >100 mcg/min cause vasodilatation of arterial system reducing afterload, SVR and SBP.*
-WHEN CONCURRENT HYPERTENSION AND ELEVATED SYSTEMIC VASCULAR RESISTANCE: Sodium Nitroprusside infusion (IC) starting at 0.25-0.5 mcg/kg/min increasing slowly up to 5mcg/kg/min may be given in Critical Care areas at BMC.
BMC CAVEAT SNP: *(1)Prolonged SNP administration may be associated with toxicity from metabolites of thiocyanate and should be avoided especially in patients with severe renal or hepatic failure . (2) Use cautiously in presence of ischemic heart disease.*
-FOR VASODILATION WITH NATRUIRESIS IN DECOMPENSATED HEART FAILURE: Nesiritide 2mcg/kg bolus followed by 0.01 mcg/kg/min infusion may be given in designated Telemetry units of BMC if followed by the Cardiomyopathy Service and may be given in all Critical Care areas of BMC. Currently there is no designated AHA/ACC recommendation for Nesiritide in heart failure.

INOTROPIC AGENTS:
PERIPHERAL HYPOPERFUSION WITH OR WITHOUT PULMONARY CONGESTION OR PULMONARY EDEMA REFRACTORY TO DIURETICS WITH VASODILATORS AT OPTIMAL DOSES:
-**Dobutamine** initiated at 2.5-5.0 mcg/kg/min may be given in designated Telemetry areas of BMC with a Cardiology consult. Higher doses require a Critical Care Unit at BMC. Dobutamine up to 20 mcg/kg/min may be administered. (IIa)
-Dopamine at ≤2-3mcg/kg/min may be used on designated Telemetry areas of BMC to improve renal blood flow and diuresis in decompensated heart failure with hypotension and low urine output. It may be increased in these areas up to 5 mcg/kg/min to give moderate inotropic support. Doses higher than 5mcg/kg/min require a Critical Care Unit at BMC. (IIb)
-Milrinone 50mcg/kg bolus over 20 minutes then 0.25 mcg/kg/min is reserved for patients in Critical Care Unit. It has significant inotropic effect. It causes peripheral vasodilatation further reducing afterload improving forward flow. Its infusion requires that patient have adequate systemic BP and filling pressures before initiating. May be preferred to dobutamine for patients on concomitant beta blocker therapy and/or an inadequate response to dobutamine. (IIb)

ANTICOAGULATION DVT PROPHYLAXIS FOR SYSTOLIC HEART FAILURE :
Enoxaparin 40mg sc once a day or UFH 5000 units sc three times a day.(IA)
BMC DVT CAVEAT: *For CrCl< 30 ml /min Enoxaparin 30 mg every 24 hrs*

HEART FAULURE: BEYOND ACUTE MANAGEMENT CARE

ORAL DIURETICS:

VOLUME OVERLOAD: When transitioning from IV to oral diuretics, administer the equivalent oral diuretic dose. (IC)

BMC DIURETIC CAVEATS: *(1) Furosemide 40 mg IV is the equivalent of furosemide 80 mg po . (2) Patient should be on stable po diuretic dose for at least 24 hr prior to discharge.(3) AT DISCHARGE: Instruct patient to weigh self daily and to call their physician for +/- 2-3 lb over 1-2 days and with all 5 lb weight changes.*

ANGIOTENSIN CONVERTING ENZYME INHIBITOR (ACEI) FOR ALL PATIENTS CURRENT OR PRIOR SYMPTOMS OF HF AND LVEF≤40% :

Initiate ACEI therapy with captopril 6.25 mg po as X 1 dose. If SBP>90 mmHg in 8hr and no adverse effects increase to 12.5 mg po every 8hr. Goal for titration is the equivalent of captopril 50 mg every 8hr which may require additional outpatient titration. (IA)

BMC ACEI CAVEAT: *Change to equivalent once a day dose 24hr prior to discharge unless three times a day dosing preferred because of relative hypotension .*

ANGIOTENSIN II RECEPTOR BLOCKER (ARB) WITH CURRENT OR PRIOR SYMPTOMS OF HF WHO ARE ACEI INTOLERANT

Valsartan 40 mg po twice a day or Losartan 50mg po once a day and uptitrate as appropriate may be used for patients who are ACEI intolerant (IA)

BMC ARB CAVEAT: (1) *Particularly useful when cough limits ACEI use.* ***(2)*** *Consult pharmacy if considering ARB in patients with angioedema to ACEI.*

HYDRALAZINE/NITRATE COMBINATION:

INTOLERANT OF ACEI OR ARB BECAUSE OF RENAL DYSFUNCTION OR HYPERKALEMIA: Start hydralazine 25 mg po three times a day and Isordil 10 mg po three times a day and uptitrate as tolerated. (IIb)

AFRICAN AMERICAN NYHA CLASS III-IV HEART FAILURE PATIENTS WHO ARE ALREADY ON STANDARD TREATMENT OF ACEI OR ARB, DIURETIC AND BETA BLOCKER: Bidil (Hydralazine 37.5 mg in combination with Isosorbide dinitrate 20 mg tid) is recommended.

BMC BIDIL CAVEAT: (1) *Bidil in combination with standard therapy in African Americans reduced death rate by 43% at 1yr in the A-HeFT trial .*

BETA BLOCKERS:

NYHA CLASS I-IV WHEN EUVOLEMIC: Start with carvedilol 3.125mg po twice a day or metoprolol succinate (Toprol XL) 12.5-25 mg po once a day.(IA)

BMC BETA BLOCKER CAVEATS: *(1) Initiate at low doses only when euvolemic . (2) Patient started on beta blockers during their hospitalization should be seen within 2 weeks of hospital discharge.* (3) *Carvedilol dose should not be changed more often than every 1-2 weeks.*

DIGOXIN:

HEART FAILURE SYMPTOM CONTROL IF PERSISTENT SYMPTOMS ON STANDARD THERAPY OR FOR RATE CONTROL OF ATRIAL FIBRILLATION IN PATIENTS WITH HEART FAILURE:

Digoxin 0.0625-0.25mg po once a day or once every other day.(IC)

BMC DIGOXIN CAVEAT: *(1) Targeted serum digoxin level for patients in heart failure is 0.5-1.0ng/ml. (2) Decrease digoxin by 1/2 if amiodarone is started.*

HEART FAULURE: BEYOND ACUTE MANAGEMENT CARE

ORAL DIURETICS:

VOLUME OVERLOAD: When transitioning from IV to oral diuretics, administer the equivalent oral diuretic dose. (IC)

BMC DIURETIC CAVEATS: *(1) Furosemide 40 mg IV is the equivalent of furosemide 80 mg po . (2) Patient should be on stable po diuretic dose for at least 24 hr prior to discharge.(3) AT DISCHARGE: Instruct patient to weigh self daily and to call their physician for +/- 2-3 lb over 1-2 days and with all 5 lb weight changes.*

ANGIOTENSIN CONVERTING ENZYME INHIBITOR (ACEI) FOR ALL PATIENTS CURRENT OR PRIOR SYMPTOMS OF HF AND LVEF≤40% :

Initiate ACEI therapy with captopril 6.25 mg po as X 1 dose. If SBP>90 mmHg in 8hr and no adverse effects increase to 12.5 mg po every 8hr. Goal for titration is the equivalent of captopril 50 mg every 8hr which may require additional outpatient titration. (IA)

BMC ACEI CAVEAT: *Change to equivalent once a day dose 24hr prior to discharge unless three times a day dosing preferred because of relative hypotension .*

ANGIOTENSIN II RECEPTOR BLOCKER (ARB) WITH CURRENT OR PRIOR SYMPTOMS OF HF WHO ARE ACEI INTOLERANT

Valsartan 40 mg po twice a day or Losartan 50mg po once a day and uptitrate as appropriate may be used for patients who are ACEI intolerant (IA)

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HYDRALAZINE/NITRATE COMBINATION:

INTOLERANT OF ACEI OR ARB BECAUSE OF RENAL DYSFUNCTION OR HYPERKALEMIA: Start hydralazine 25 mg po three times a day and Isordil 10 mg po three times a day and uptitrate as tolerated. (IIb)

AFRICAN AMERICAN NYHA CLASS III-IV HEART FAILURE PATIENTS WHO ARE ALREADY ON STANDARD TREATMENT OF ACEI OR ARB, DIURETIC AND BETA BLOCKER: Bidil (Hydralazine 37.5 mg in combination with Isosorbide dinitrate 20 mg tid) is recommended.

BMC BIDIL CAVEAT: (1) *Bidil in combination with standard therapy in African Americans reduced death rate by 43% at 1yr in the A-HeFT trial .*

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NYHA CLASS I-IV WHEN EUVOLEMIC: Start with carvedilol 3.125mg po twice a day or metoprolol succinate (Toprol XL) 12.5-25 mg po once a day.(IA)

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DIGOXIN:

HEART FAILURE SYMPTOM CONTROL IF PERSISTENT SYMPTOMS ON STANDARD THERAPY OR FOR RATE CONTROL OF ATRIAL FIBRILLATION IN PATIENTS WITH HEART FAILURE:

Digoxin 0.0625-0.25mg po once a day or once every other day.(IC)

BMC DIGOXIN CAVEAT: *(1) Targeted serum digoxin level for patients in heart failure is 0.5-1.0ng/ml. (2) Decrease digoxin by 1/2 if amiodarone is started.*

ALDOSTERONE ANTAGONIST:
NYHA CLASS III-IV: Consider spironolactone 25-50 mg po once a day if preserved renal function (*CrCl>30 ml/min*) and normal potassium level. (IB)
BMC ALDOSTERONE ANTAGONIST CAVEAT: *(1) Use very cautiously with elderly or diabetic patients. (2) Monitor electrolytes particularly potassium and discontinue if hyperkalmia occurs.(3) Patients started on aldosterone antagonist should have their chemistries drawn 10-14 days after initiation as an outpatient .*

AMIODARONE:
PREVENTION OF ATRIAL FIBRILLATION AND/OR FOR SUPPRESSION OF LIFE THREATENING VENTRICULAR ARRHYTHMIAS IN HEART FAILURE: Amiodarone is the preferred agent in heart failure. (IB)
BMC AMIODARONE CAVEAT (1) See BMC Medication Guideline for dosing recommendations (2) *Decrease digoxin and warfarin doses by 1/2 when starting amiodarone therapy*

CHF ULTRAFILTRATION : This modality is available at BMC on selected Telemetry Units and Critical Care and may be employed in decompensated HF where there are 2 or more signs of fluid volume overload and diuretic resistance provided patient's SBP≥ than 90 mmHg and SCr≤ 3.
BMC UF CAVEAT: *Consult Cardiomyopathy Fellow*

DEVICE THERAPY GUIDELINES

ICD INDICATIONS FOR PRIMARY PREVENTION OF SUDDEN DEATH
(Patient must be receiving optimal medical therapy and have reasonable expectation of survival with good functional status for more than 1 year.)

CLASS I: (Procedure SHOULD be performed)
1) ICD therapy is indicated in patients with **LVEF < 35%** due to **prior MI** who are at least 40 days post myocardial infarction and are in NYHA functional Class II and III .(IA) *
2) ICD therapy is indicated in patients with LV dysfunction due to **prior MI** who are at least 40 days post MI , have an **LVEF < 30%** and are in NYHA functional Class I . (IA) *
3) ICD therapy is indicated in patients with nonischemic dilated cardiomyopathy who have an LVEF≤ 35% and who are in NYHA functional Class II or III .(IB)

CLASS IIb: (Procedure may be considered)
1) ICD may be considered in patients with nonischemic heart disease who have an LVEF ≤ 35% and who are in NYHA functional Class I .(IIb)

* CMS Reimbursement Guideline: No revascularization within 90 days

CARDIAC RESYNCHRONIZATION THERAPY IN PATIENTS WITH SEVERE SYSTOLIC HEART FAILURE

CLASS I : (Procedure SHOULD be perfromed)

1) For patients who have an LVEF ≤ 35%, a QRS duration ≥ 0.12 seconds and sinus rhythm, cardiac resynchronization therapy (CRT) with or without an ICD is indicated for the treatment of NYHA functional Class III or ambulatory Class IV symptoms with optimal medical therapy .(IA)
BMC CAVEAT : *Usually done in combination with ICD*

ALDOSTERONE ANTAGONIST:
NYHA CLASS III-IV: Consider spironolactone 25-50 mg po once a day if preserved renal function (*CrCl>30 ml/min*) and normal potassium level. (IB)
BMC ALDOSTERONE ANTAGONIST CAVEAT: *(1) Use very cautiously with elderly or diabetic patients. (2) Monitor electrolytes particularly potassium and discontinue if hyperkalmia occurs.(3) Patients started on aldosterone antagonist should have their chemistries drawn 10-14 days after initiation as an outpatient .*

AMIODARONE:
PREVENTION OF ATRIAL FIBRILLATION AND/OR FOR SUPPRESSION OF LIFE THREATENING VENTRICULAR ARRHYTHMIAS IN HEART FAILURE: Amiodarone is the preferred agent in heart failure. (IB)
BMC AMIODARONE CAVEAT (1) See BMC Medication Guideline for dosing recommendations (2) *Decrease digoxin and warfarin doses by 1/2 when starting amiodarone therapy*

CHF ULTRAFILTRATION : This modality is available at BMC on selected Telemetry Units and Critical Care and may be employed in decompensated HF where there are 2 or more signs of fluid volume overload and diuretic resistance provided patient's SBP≥ than 90 mmHg and SCr≤ 3.
BMC UF CAVEAT: *Consult Cardiomyopathy Fellow*

DEVICE THERAPY GUIDELINES

ICD INDICATIONS FOR PRIMARY PREVENTION OF SUDDEN DEATH
(Patient must be receiving optimal medical therapy and have reasonable expectation of survival with good functional status for more than 1 year.)

CLASS I: (Procedure SHOULD be performed)
1) ICD therapy is indicated in patients with **LVEF < 35%** due to **prior MI** who are at least 40 days post myocardial infarction and are in NYHA functional Class II and III .(IA) *
2) ICD therapy is indicated in patients with LV dysfunction due to **prior MI** who are at least 40 days post MI , have an **LVEF < 30%** and are in NYHA functional Class I . (IA) *
3) ICD therapy is indicated in patients with nonischemic dilated cardiomyopathy who have an LVEF≤ 35% and who are in NYHA functional Class II or III .(IB)

CLASS IIb: (Procedure may be considered)
1) ICD may be considered in patients with nonischemic heart disease who have an LVEF ≤ 35% and who are in NYHA functional Class I .(IIb)

* CMS Reimbursement Guideline: No revascularization within 90 days

CARDIAC RESYNCHRONIZATION THERAPY IN PATIENTS WITH SEVERE SYSTOLIC HEART FAILURE

CLASS I : (Procedure SHOULD be perfromed)

1) For patients who have an LVEF ≤ 35%, a QRS duration ≥ 0.12 seconds and sinus rhythm, cardiac resynchronization therapy (CRT) with or without an ICD is indicated for the treatment of NYHA functional Class III or ambulatory Class IV symptoms with optimal medical therapy .(IA)
BMC CAVEAT : *Usually done in combination with ICD*

SYNCOPE

1.The following should be done in all patients

- Attempt to contact eyewitnesses for account of events
- Obtain family history of sudden death
- Assess BP in both arms and postural signs
- Check ECG, CBC and serum chemistries
- Obtain transthoracic echocardiogram if not done within prior one year

2.Patients with the following characteristics should be admitted to Telemetry for evaluation and an EP Consult obtained:

A. Suspected or known significant structural heart disease
B. ECG abnormality suggesting an arrhythmia
   1. WPW
   2. Long QT
   3. LBBB or RBBB
   4. HR < 50/min or pauses >3 seconds
   5. Mobitz I or more advanced degree of heart block
   F. Documented tachyarrhythmia
C. Syncope during exercise
D. Syncope occurring in the supine position
E. Syncope causing severe injury
F. Family history of sudden death
G. Associated palpitations
H. Frequent episodes (> than twice in one year)
I. Implanted pacemaker or defibrillator
J. High risk occupation (For example, bus driver, pilot , public safety etc..)

3. **In the absence of these high risk characteristics , an EP Consult is not required for single episode of syncope**. An EP consult is also not required for patients in whom hypotension or orthostasis is the basis for syncope. Tilt Table test is rarely indicated after a single episode of syncope or with documented hypotension associated with episode.

4. Order morning postural signs during the admission particularly in elderly as well as diabetic patients to assist with determining cause of syncope.

5. **Inpatient tilt table testing requires an EP Consult** .

6. Massachusetts state law prohibits operating a motor vehicle for six months after a syncopal episode unless the cause is definitively reversed.

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ACUTE MANAGEMENT OF ATRIAL FIBRILLATION AND ATRIAL FLUTTER

1. Rate control to target HR of 75 ± 15 bpm at rest using metoprolol, verapamil or diltiazem .(IB) Digoxin adjusted for renal function may be used as an adjunct agent especially in patients with underlying heart failure. (IB)

2. When a rapid ventricular response does not respond promptly to pharmacological measures to slow rate with evidence of ongoing myocardial ischemia, symptomatic hypotension or HF, immediate R wave synchronized cardioversion should be done without delay for prior initiation of anticoagulation . (IC)

3. When AF is **clearly documented to be under 48 hrs**, the need for anticoagulation before and after cardioversion may be based on patient's risk of thromboembolism CHADS2 Score. (IIa)

4. For patients with **AF of 48 hrs duration or longer or when the duration of AF is unknown** anticoagulation (INR 2-3) is recommended for at least 3 wks prior to 4 wks after cardioversion regardless of method used to restore sinus rhythm. (IB)
***BMC CAVEAT** : Enoxaparin or UFH should be started as a bridge to warfarin when cardioversion is envisioned. If no cardioversion is planned , warfarin may be initiated without bridging.*

5. To determine patient's need for long term anticoagulation for AF when CARDIOVERSION IS NOT PLANNED USE CHADS2 SCORING SYSTEM (IA)

CHADS2 SCORING SYSTEM

RISK FACTORS (Points)	CHADS2 Score	Annual Stroke Risk
	0	1.9%
CHF or LVEF<35% (1)	1	2.8%
	2	4.0%
HTN including Rx (1)	3	5.9%
	4	8.5%
Age>75 (1)	5	12.5%
	6	18.2%
Diabetes (1)		
Stroke or TIA (2)		

CHADS2 score = 0 (ASA 81 mgs to 325 mgs only)
CHADS2 score = 1 (ASA 81 mgs to 325 mgs only or Warfarin INR 2-3)
CHADS2 score ≥ 2 (Warfarin INR 2-3)

***BMC CAVEAT:** When indicated by CHADS2 score, preponderance of evidence continues favors warfarin use in the elderly with annual intracranial bleed risk 1-2% .*

6. AF with mitral stenosis or prosthetic heart valves require warfarin regardless of CHADS2 score targeting INR 2.5-3.5 if prosthetic heart valve present.

7. For atrial flutter, ablation is a reasonable alternative to cardioversion. Otherwise the guidelines for atrial flutter are the same as for atrial fibrillation .

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VASCULAR MEDICINE

ALL PATIENTS ATHEROSCLEROTIC VASCULAR DISEASE : Should receive antiplatelet therapy and lipid lowering therapy targeting LDL< 100 . Consider evaluation by vascular specialist . Patient with limb ulcers and peripheral vascular disease should have expedited consult for consideration for revascularization .(IA)

WHO TO TEST	WHAT TO TEST
PVD 1. Leg Symptoms with exertion 2. Limb Ulcer 3. Age >70 4. Age >55 +DM or smoking	**ABI/PVR**
RENAL ARTERY DISEASE 1. Resistant HTN (>2 meds) 2. Flash Pulmonary Edema 3. Unexplained azotemia or atrophic kidney	**RENAL ARTERY DUPLEX** (Must be NPO for 6 Hrs)
CAROTID ARTERY DISEASE 1. History of TIA or CVA 2. Carotid Bruit	**CAROTID ULTRASOUND**
AORTIC ANEURYSM 1. Men age 65-75 +history of smoking 2. Men > 60 with family history of AAA	**ABDOMINAL AORTA ULTRASOUND**

(1) VASCULAR TESTS are performed by the VASCULAR LAB **X48738.**

(2) **To order vascular tests in SCM ,** go under the browser function scroll down to Vascular Lab .Open this tab and then select the appropriate vascular test for your patient.

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Vascular Medicine Consults Page 1234

MANAGEMENT OF HYPERGLYCEMIA IN ACS

ALL HYPERGLYCEMIC PATIENTS WHO ARE INSULIN DEFICENT: May have cardiovascular benefit from insulin therapy if glucose >150mg/dl in both random and fasting state or glucose >200 mg/dl at any time. **NOTE: Many patients need insulin only transiently around an MI or critical illness.**

FOR STEMI AND/OR CRTITICALLY ILL PATIENTS (eg requiring mechanical ventilation or requiring inotropic support): Insulin Infusion with dextrose per Critical Care bedside guideline (goal 80-150mg/dl in CCU).
Class I B (complicated STEMI), Class IIA (uncomplicated STEMI*)*
BMC CAVEAT INSULIN INFUSION : *Type "insulin" in SCM to find order. Replete potassium twice daily to keep K >/= 4.0.*

TRANSITIONING IV INFUSION to SC INSULIN once patient stable and eating
(1) This works well when the rate AND glucose are stable for >3 hours and the glucose is near goal. .
(2) Choose the appropriate insulin and diet orders in SCM
(3) Give the basal dose (glargine or NPH split q12 hrs) and then stop the drip 2 hours later **or** give both basal and nutritional together and stop the drip 1 hour later.

To calculate the dose:

	On D5 ≥40cc/hr, Enteral nutrition at > half goal, or TPN	**No significant calories**
Total Daily Dose calculation	Last hourly rate X 20	Last hourly rate X 40
Basal dose calculation	Last hourly rate X 10	Last hourly rate X 20

NOT FOR USE when insulin needs are dropping (such as post-DKA) or rising quickly (start of tube feedings)

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Total Daily Dose calculation	Last hourly rate X 20	Last hourly rate X 40
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NOT FOR USE when insulin needs are dropping (such as post-DKA) or rising quickly (start of tube feedings)

FOR NSTEMI AND OTHER ACS : Scheduled weight-based insulin.
BMC CAVEAT: *Consider "glargine/lispro" program since easy to dose and safely-dosed glargine may cause less hypoglycemia if patient made NPO. Use dosing guideline below:*

Calculate the total daily insulin dose (TDD) and split up the regimen.

Most patients will need Basal, Nutritional and Correction doses

	Insulin Sensitive (Type 1 or thin/ elderly patient)	MOST Type 2 Patients (even new onset)	Insulin Resistant
Total Daily Dose	0.3-0.4 units/kg/ day	0.5-0.7 units/kg/ day	0.7-1.5 units/kg/ day
Basal insulin *Glargine q24 or NPH split qAM and qHS*	50% TDD	50% TDD	50% TDD
Nutritional insulin	2 units to start	4 units to start	6 units to start
	Will likely need 4 -8 units	Will likely need 6 -12 units	Will likely need 8 -20+ units
Correction insulin	Ok to use algorithms in order sets to start		

PLANNING FOR DISCHARGE

Obtain Hemoglobin A1c Day One :
If >7%, patient requires optimization of home program, and may require insulin (IIa) .
If >10%, patient requires insulin upon discharge (IA)

Order Diabetes Nurse Practitioner Consult in SCM for
New onset diabetes with cardiac disease
New to insulin therapy

Consider Metformin Therapy F or
Metabolic syndrome and new glucose intolerance, +/- HA1c >6.5%
BMC CAVEAT : Initiate metformin at 500 mg po once daily. After three days may titrate to 500 mg twice daily. This strategy may help to minimize GI upset

PAGE "GLUC" (4582) WITH QUESTIONS

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BOSTON MEDICAL CENTER

IMPORTANT CARDIOLOGY PHONE NUMBERS

PCI INTERVENTIONAL BEEPER	**(617) 638-5795 pager 7822**
Cardiac Cath Lab	(617) 638-8702
Outpatient Cardiology Appointments	(617) 638-7490
Noninvasive Cardiology Testing	(617) 638-8745
Cardiomyopathy Service	(617) 638-8060
Electrophysiology Service	(617) 638-8734
Electrophysiology Lab	(617) 638-6585
Cardiac Rehabilitation	(617) 638-8720
Vascular Lab	(617) 414-8738
Cardiothoracic Surgery	(617) 638-7350

BMC AUTHORS
DEBORAH WHALEN APRN-BC, MSN, MBA
GEORGE PHILIPPIDES MD

CONTRIBUTORS
WILSON COLUCCI MD
DIANE GAUTHIER APRN
JEFFREY GREENWALD MD
NAOMI HAMBURG MD
ALICE JACOBS MD
MICHAEL KLEIN MD
PAUL LELORIER MD
MARIE MCDONNELL MD
KATE PHILLIPS Pharm D

AHA/ACC LEVEL OF RECOMMENDATION

(I):Evidence and/or agreement treatment is both useful and effective**. (IIa):**Weight of evidence/ opinion is in favor of usefulness/efficacy. **(IIb)** Usefulness/efficacy is less well established by evidence/opinion

AHA/ACC LEVEL OF EVIDENCE

(A) Multiple randomized trials or meta analysis (B) Single randomized trial or nonrandomized trials (C) Consensus opinion

July 2008

BOSTON MEDICAL CENTER

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