General Considerations for Antiplatelet and Anticoagulant Therapy (STEMI)

	UFH	Enoxaparin	Fondaparinux	Bivalirudin	Eptifibatide	Abciximab	Tirofiban
Mechanism & Duration	Thrombin and factor Xa inactivation. Prevents conversion of fibrinogen to fibrin Duration: 1 - 2 hrs	Factor Xa inhibition Duration: 1 hr; longer if CKD	Factor Xa inhibition Duration: 2 - 3 hrs; longer if CKD	Directly inhibits thrombin Duration: 2 hrs; longer if CKD	IIb/IIIa receptor blocker Duration: 4 hrs	IIb/IIIa receptor blocker Duration: 0.5 hrs, will experience mild effect for 7 days	IIb/IIIa receptor blocker Duration: 4 hrs
Dose if patient received prior anti-coagulation	IV GPI planned: Additional UFH as needed to achieve an ACT of 200 to 250 s No IV GPI planned: additional UFH as needed to achieve an ACT of 250 to 300 s for HemoTec, 300 to 350 s for Hemochron	An additional dose of 0.3 mg/kg IV enoxaparin should be administered at the time of PCI to patients who have received < 2 therapeutic subcutaneous doses (eg, 1 mg/kg) or received the last subcutaneous enoxaparin dose 8 to 12 hrs. No additional dose given if last therapeutic dose was less than 8 hrs prior. Patients treated with therapeutic enoxaparin (1 mg/kg subcutaneous) within 12 h of PCI should not receive additional treatment with UFH during PCI ("stacking"). Patients who have received therapeutic enoxaparin (1 mg/kg subcutaneous) > 12 hrs prior to PCI usually receive full-dose UFH or bivalirudin anticoagulation and not enoxaparin.	For prior treatment with fondaparinux, administer additional IV treatment with an anticoagulant possessing anti-IIa activity (UFH or bivalirudin), taking into account whether GPI receptor antagonists have been administered.	For patients who have received UFH, wait 30 min, then give 0.75 mg/kg IV bolus.			
Dose if no prior anti-coagulation	50-70 units/kg IV if GP IIb/IIIa inhibitor is on board, to achieve an ACT of 200-250 s 60-100 units/kg IV if no GP IIb/IIIa inhibitor is on board, to achieve target ACT of 250 to 300 s for HemoTec, 300 to 350 s for Hemochron.	0.5 – 0.75 mg/kg IV bolus	Fondaparinux should not be used as the sole anticoagulant to support PCI.	0.75 mg/kg IV bolus	Two 180mcg IV doses 10min apart	0.25mg/kg IV	25mcg/kg IV
Mainten-ance Dose	12U/kg/h (maximum 1000U/h)	No additional IV enoxaparin given during PCI		1.75mg/kg/h with stopping of infusion at the end of procedure	1.0mcg/kg/min IV for ≤18 hours	0.125 mcg/kg/min (maximum 10mcg/min) for 12 hour	0.15 mcg/kg/min for 24 hour

<table>
<tr><th></th><th>UFH</th><th>Enoxaparin</th><th>Fondaparinux</th><th>Bivalirudin</th><th>Eptifibatide</th><th>Abciximab</th><th>Tirofiban</th></tr>
<tr><td>Reversal</td><td>Protamine:<table><tr><th>Timing after UFH</th><th>Dose/100 units of UFH</th></tr><tr><td>Immediately</td><td>1mg (or 25 mg fixed dose)</td></tr><tr><td>30 min to 2 hrs after</td><td>0.5mg (or 10mg fixed dose)</td></tr><tr><td>> 2 hrs after</td><td>0.25mg (or 10mg fixed dose)</td></tr><tr><td colspan="2">Max dose: 50 mg</td></tr></table>*Protamine sulfate can cause severe hypotensive and anaphylactoid-like reactions when administered too rapidly. Facilities to treat shock should be available.</td><td>Protamine:<table><tr><th>Timing after Enoxaparin</th><th>Dose/each 1 mg enoxaparin</th></tr><tr><td>< 8 hrs</td><td>1mg (or 50 mg fixed dose)</td></tr><tr><td>8-12 hrs</td><td>0.5mg (or 25 mg fixed dose)</td></tr><tr><td>>12 hrs</td><td>Not likely to be useful (or 25 mg fixed dose)</td></tr><tr><td colspan="2">Max dose: 50 mg</td></tr></table>*Protamine sulfate can cause severe hypotensive and anaphylactoid-like reactions when administered too rapidly. Facilities to treat shock should be available.</td><td>Consider FEIBA 20 units/kg or rFVIIa 90 mcg/kg</td><td>None</td><td>None</td><td>Platelet transfusion</td><td>None</td></tr>
<tr><td>Renal Factors</td><td>None</td><td></td><td></td><td>Reduce dose to 1mg/kg/h with CrCl <30 mL/min
Or
0.25mg/kg/h if patient is on dialysis</td><td>CrCl<50ml/min : Clearance reduced by 50%</td><td>None</td><td>CrCl ≤60 mL/min: Decrease post loading dose infusion by 50% to 0.075 mcg/kg/min IV</td></tr>
<tr><td>Special note</td><td>If GP IIb/IIIa is not going to be used OR a switch is to be made to bivalirudin then additional boluses given in the Cath lab should maintain ACT > 250

Protamine calculator:
http://clincalc.com/Protamine/</td><td></td><td></td><td>Make sure that antiplatelet treatment with aspirin and a P2Y12 inhibitor have been administered. Bivalirudin prolongs the prothrombin time and resulting prolongation of the INR may not necessarily be reflective of anticoagulation status.</td><td>May cause severe acute thrombo-cytopenia</td><td>May cause severe acute thrombo-cytopenia</td><td>May cause severe acute thrombo-cytopenia</td></tr>
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Adapted from the original General Considerations for Anticoagulation and Antiplatelet therapy in PCI Tool, from the Bleeding Risk Toolkit available through the ACC Quality Improvement for Institutions program on CVQuality.ACC.org. Reviewed and updated 10/2018 by the ACC Reduce the Risk: PCI Bleed Campaign Steering Committee.

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