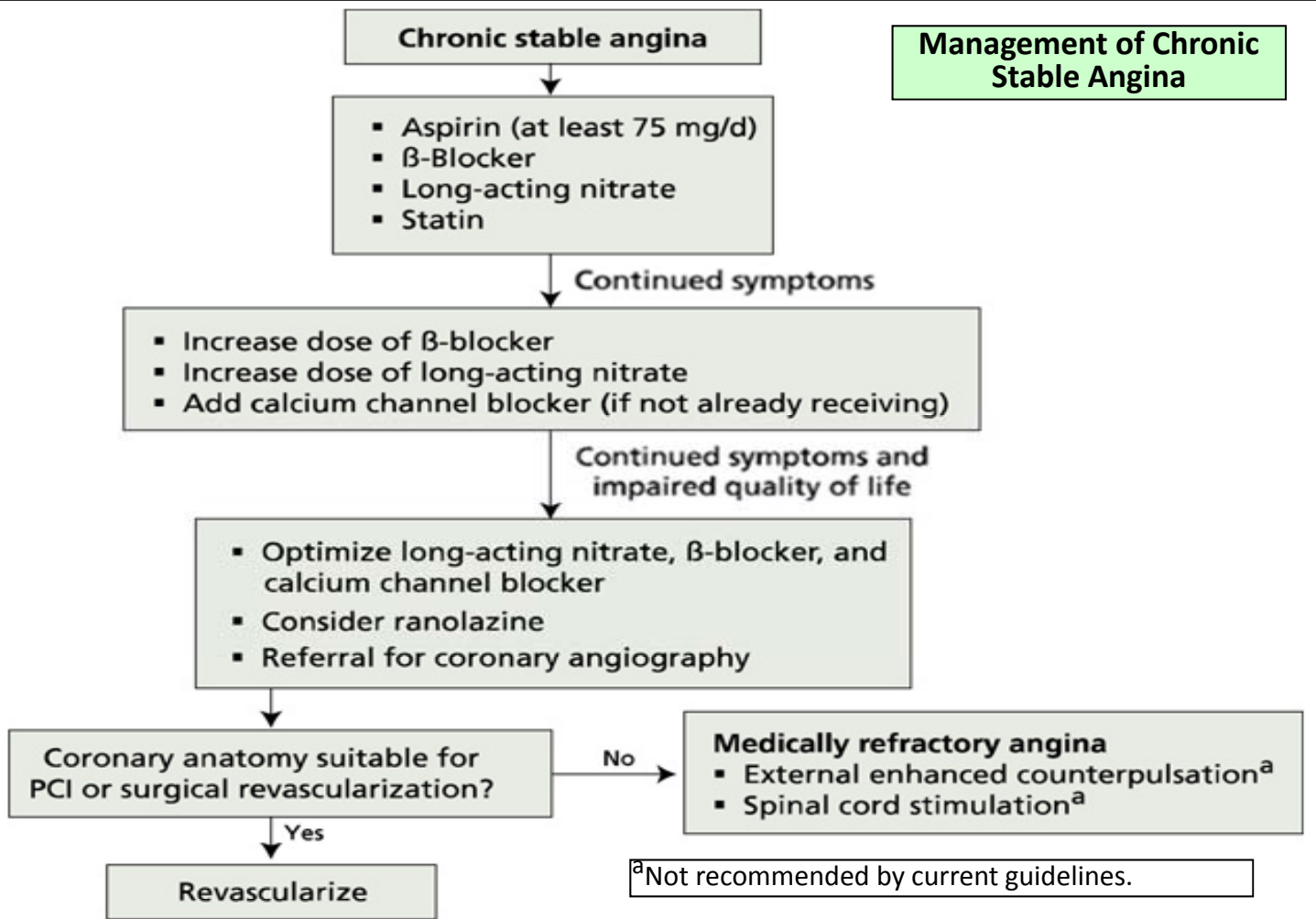## CORONARY ARTERY DISEASE

1. Risk factors for developing coronary artery disease include older age, male sex, elevated blood pressure, high serum cholesterol, cigarette smoking, and diabetes mellitus.
2. The Framingham risk score is useful to evaluate whether a patient is at low, intermediate, or high risk of a coronary artery disease event in a 10-year period.
3. The benefit of assessing conditional risk factors for coronary artery disease (CAD), such as high-sensitivity C-reactive protein level, LDL particle size, lipoprotein(a), and homocysteine level in risk evaluation, has not been determined, and these tests are not recommended for routine screening for determining CAD risk.
4. Noninvasive stress testing is most useful in patients with an intermediate pretest probability of coronary artery disease as determined by the patient's age, sex, and description of the chest pain.
5. Exercise electrocardiogram (ECG) is the preferred noninvasive test for patients who can exercise and have a normal resting ECG (that is, absence of left bundle branch block, <1 mm ST-segment depression, and no evidence of preexcitation).
6. β-Blockers are first-line therapy for patients with chronic stable angina as well as those with a history of myocardial infarction.
7. Patients with chronic stable coronary artery disease and without contraindications should take aspirin.
8. Patients with reduced left ventricular ejection fraction (<35%) should be treated with an angiotensin-converting enzyme inhibitor.
9. Statins should be given to most patients with established coronary artery disease.
10. Percutaneous coronary intervention reduces the frequency and severity of angina but not future cardiovascular events; it should be reserved for patients with continued symptoms despite optimal medical therapy.
11. Surgical revascularization is indicated for left main coronary artery disease and multivessel coronary artery disease with involvement of the left anterior descending coronary artery and reduced ejection fraction.
12. Patients with medically refractory angina may benefit from external enhanced counterpulsation or spinal cord stimulation.
13. Clopidogrel should be continued for a minimum of 1 year following drug-eluting stent placement and for a minimum of 1 month following bare metal stent placement.
14. The risk of coronary stent thrombosis is approximately 0.7% and is increased with the premature discontinuation of dual antiplatelet therapy (aspirin and clopidogrel).
15. Patients who must undergo noncardiac surgery that cannot be delayed to allow completion of dual antiplatelet therapy should continue aspirin during the perioperative period and restart clopidogrel as soon as possible following the procedure.

16. All unstable angina/non–ST-elevation myocardial infarction patients without contraindications should be treated initially with aspirin, β-blockers, and nitrates.
17. Unstable angina or non–ST-elevation myocardial infarction patients with TIMI risk scores of 3 or more generally benefit from an early invasive approach.
18. All unstable angina/non–ST-elevation myocardial infarction patients without contraindications should be given antiplatelet therapy with aspirin and clopidogrel.
19. Unstable angina/non–ST-elevation myocardial infarction patients should receive early treatment with high-dose statins to achieve a target LDL cholesterol of less than 100 mg/dL (2.6 mmol/L) (optional goal <70 mg/dL [1.8 mmol/L]).
20. ST-elevation myocardial infarction patients presenting to a hospital with percutaneous coronary intervention (PCI) capability should be treated with primary PCI within 90 minutes of first medical contact; those presenting to a hospital without PCI capability and who cannot be transferred to a PCI center and undergo PCI within 90 minutes should be treated with fibrinolytic therapy.
21. Initial medical therapy for ST-elevation myocardial infarction includes general treatment measures (aspirin, analgesics, nitrates, and oxygen), therapy to reduce infarct size (β-blockers and angiotensin-converting enzyme inhibitors), antithrombotic therapy (unfractionated or low-molecular-weight heparin), and antiplatelet therapy (clopidogrel and glycoprotein IIb/IIIa inhibitors).
22. Clopidogrel should be added to standard medical and thrombolytic therapy, as it further reduces cardiovascular events without a significant increase in bleeding.
23. Early complications after ST-elevation myocardial infarction include failure of thrombolytic therapy.
24. Treadmill exercise electrocardiographic testing has a higher false-positive rate in women than men but remains the first-line noninvasive test for women with suspected coronary artery disease because of the low false-negative rate.
25. Women with myocardial infarction treated with fibrinolytic, antiplatelet, and/or antithrombotic therapies have a higher rate of bleeding complications compared with men, and appropriate dosing of these medications should be based on patient weight and estimated glomerular filtration rate.
26. An early invasive strategy in women with unstable angina or non–ST-elevation myocardial infarction and high-risk features reduces major adverse cardiac events, but this approach in women with low risk features may be associated with an early excess risk.
27. In patients with diabetes who experience angina, exercise electrocardiographic testing has similar diagnostic sensitivity and specificity as for nondiabetic patients.
28. Although patients with diabetes mellitus are more likely to have coronary artery disease without symptoms (silent ischemia), outcome data do not support routine stress testing in asymptomatic patients.
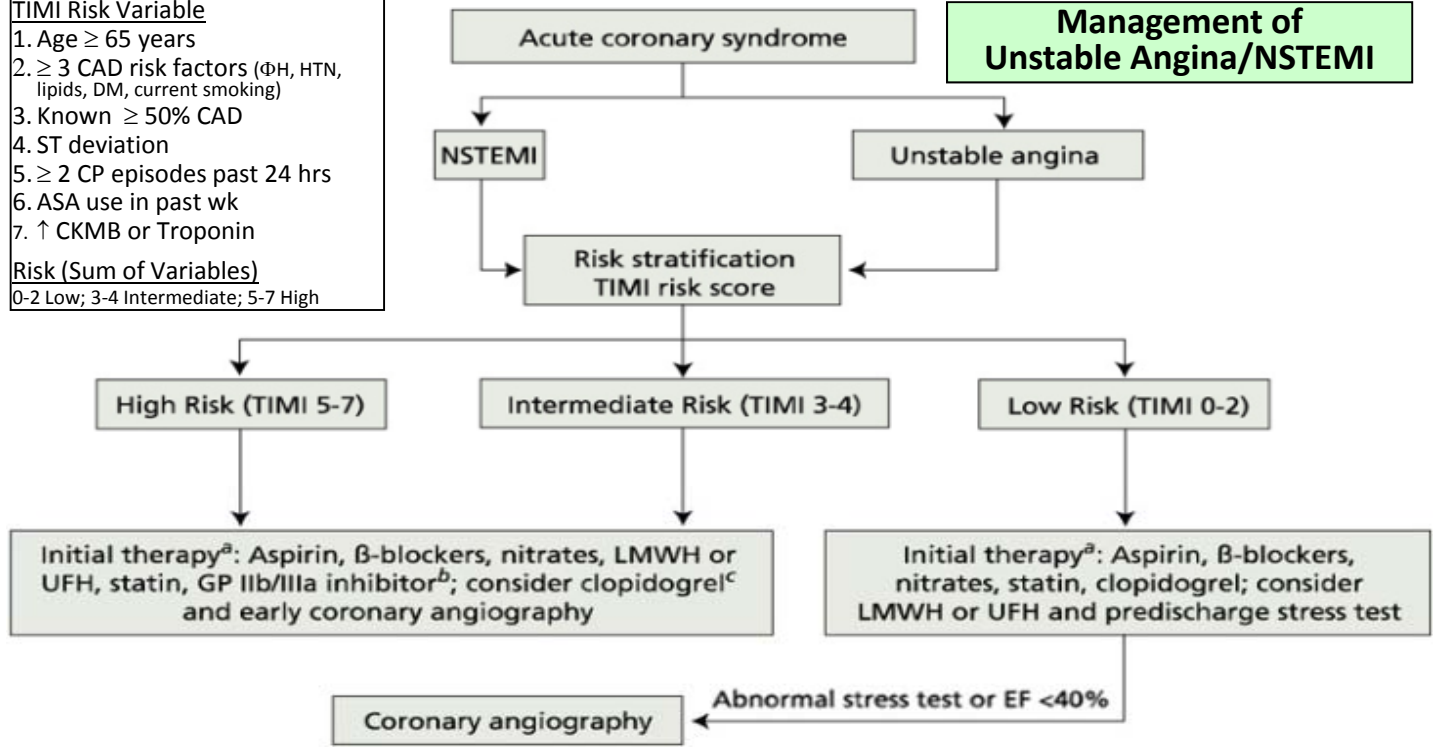
Management of Chronic Stable Angina

Chronic stable angina

↓

- Aspirin (at least 75 mg/d)
- ß-Blocker
- Long-acting nitrate
- Statin

↓ Continued symptoms

- Increase dose of ß-blocker
- Increase dose of long-acting nitrate
- Add calcium channel blocker (if not already receiving)

↓ Continued symptoms and impaired quality of life

- Optimize long-acting nitrate, ß-blocker, and calcium channel blocker
- Consider ranolazine
- Referral for coronary angiography

↓

Coronary anatomy suitable for PCI or surgical revascularization?

→ No → **Medically refractory angina**
- External enhanced counterpulsation[a]
- Spinal cord stimulation[a]

↓ Yes

Revascularize

[a]Not recommended by current guidelines.

Management of Unstable Angina/NSTEMI

TIMI Risk Variable
1. Age ≥ 65 years
2. ≥ 3 CAD risk factors (ΦH, HTN, lipids, DM, current smoking)
3. Known ≥ 50% CAD
4. ST deviation
5. ≥ 2 CP episodes past 24 hrs
6. ASA use in past wk
7. ↑ CKMB or Troponin

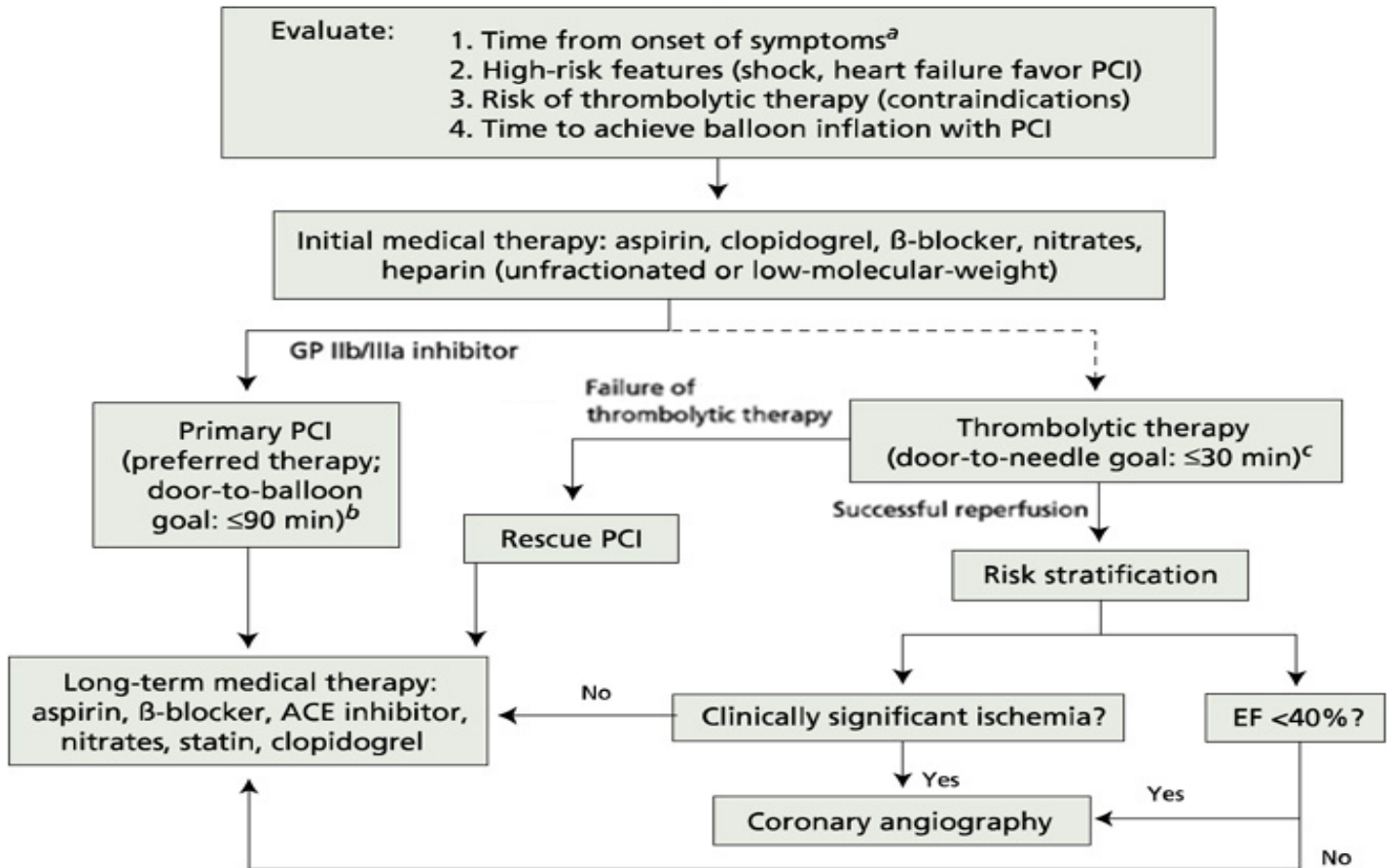**Risk (Sum of Variables)**
0-2 Low; 3-4 Intermediate; 5-7 High

Acute coronary syndrome

→ NSTEMI / Unstable angina

↓

Risk stratification TIMI risk score

↓

- **High Risk (TIMI 5-7)**
- **Intermediate Risk (TIMI 3-4)**
- **Low Risk (TIMI 0-2)**

High/Intermediate Risk:
Initial therapy[a]: Aspirin, ß-blockers, nitrates, LMWH or UFH, statin, GP IIb/IIIa inhibitor[b]; consider clopidogrel[c] and early coronary angiography

Low Risk:
Initial therapy[a]: Aspirin, ß-blockers, nitrates, statin, clopidogrel; consider LMWH or UFH and predischarge stress test

→ Abnormal stress test or EF <40% →

Coronary angiography

[a]For patients with continued symptoms despite initial medical therapy, consider GP IIb/IIIa inhibitor and emergent coronary angiography. [b]Indications for GP IIb/IIIa inhibitor include ongoing chest pain, dynamic ECG changes, elevated troponin on presentation, CHF & DM. [c]Clopidogrel can be given prior to coronary angiography. If CABG is required, clopidogrel should be stopped and surgery delayed for at least 5 days.

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Management of STEMI

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                        STEMI

Evaluate:    1. Time from onset of symptomsᵃ
             2. High-risk features (shock, heart failure favor PCI)
             3. Risk of thrombolytic therapy (contraindications)
             4. Time to achieve balloon inflation with PCI

Initial medical therapy: aspirin, clopidogrel, ß-blocker, nitrates,
          heparin (unfractionated or low-molecular-weight)
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GP IIb/IIIa inhibitor

Failure of thrombolytic therapy

Primary PCI (preferred therapy; door-to-balloon goal: ≤90 min)ᵇ

Rescue PCI

Thrombolytic therapy (door-to-needle goal: ≤30 min)ᶜ

Successful reperfusion

Risk stratification

Long-term medical therapy: aspirin, ß-blocker, ACE inhibitor, nitrates, statin, clopidogrel

No ← Clinically significant ischemia?

EF <40%?

↓ Yes

Yes

Coronary angiography

No

ᵃIf 3 or more hrs have elapsed since symptom onset, PCI is preferred.
ᵇSTEMI patients presenting to a hospital with PCI capability should be treated with primary PCI within 90 minutes of first medical contact ("door-to-balloon time") as a systems goal.
ᶜSTEMI patients presenting to a hospital without PCI capability and who cannot be transferred to a PCI center and undergo PCI within 90 minutes of first medical contact should be treated with thrombolytic therapy within 30 minutes of hospital presentation ("door-to-needle time") as a systems goal unless thrombolytic therapy is contraindicated.

Clinical Assessment of Pretest Probability of Coronary Artery Disease

		Pretest Probability		
Age (years)	Sex	Typical Chest Painᵃ	Atypical Chest Painᵇ	Nonanginal Chest Painᶜ
30-39	Male	Intermediate	Intermediate	Low
	Female	Intermediate	Low	Low
40-49	Male	High	Intermediate	Intermediate
	Female	Intermediate	Low	Low
50-59	Male	High	Intermediate	Intermediate
	Female	Intermediate	Intermediate	Low
60-69	Male	High	Intermediate	Intermediate
	Female	High	Intermediate	Intermediate

ᵃTypical chest pain has three components: (1) substernal chest pain or discomfort; (2) provoked by exertion or emotional stress; (3) relieved by rest and/or nitroglycerin.
ᵇAtypical chest pain has two of the above three components for typical chest pain.
ᶜNonanginal chest pain has none of the above components for typical chest pain.

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