Pathway Based Approach to Acute Coronary Syndrome

Mun K. Hong, MD

Director, Cardiac Catheterization Laboratory and Interventional Cardiology

St. Luke's-Roosevelt Hospital Center,

New York, New York

Introduction

- **In the United States approximately 8 million patients annually present to the emergency departments with chest pain or chest pain equivalent symptoms, which ultimately results in 2.3 million hospitalizations for Acute Coronary Syndrome (ACS).[1,2]**
- ***Clinical guidelines for the management of ACS have consistently shown a major gap between the national guidelines and their application in the actual management of patients with ACS.[3]***

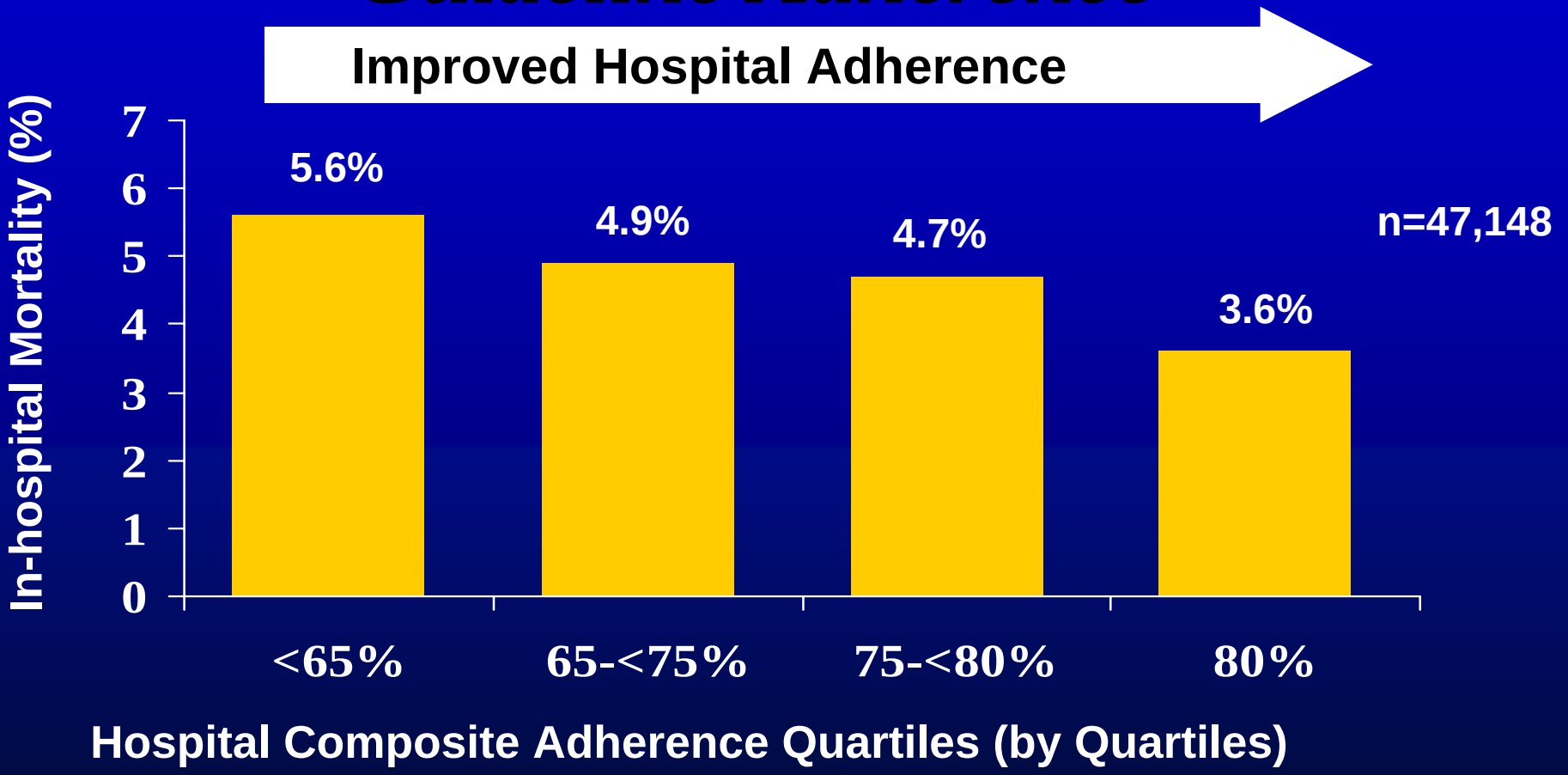
1. Elliot Rapaport; Emerging Issues in Cardiology. Emerg Med 36(6):16-26, 2004

2. AHA Heart Disease and Stroke Statistics – 2006 Update. Circulation 2006;113:e85.3

3. Fonarow GC. Rev Cardiovasc Med. 2002;3:S2-S10.

CRUSADE

In-hospital Mortality and Guideline Adherence



National Report. Available at: http://www.crusadeqi.com. Data collected from Nov, 2001– March, 2003. Adapted with permission from CRUSADE Web site, available at:http://www.crusadeqi.com. Accessed February 18, 2004.

Other Obstacles

- **Cardiologists are not always the first physicians evaluating the ACS patients.**
- **Different specialists and even cardiologists may have different approaches to the management of ACS patients.**
- **Actual daily care of ACS patients may be dependent on medical residents/cardiology fellows/nursing staff.**
- **Guidelines often do not incorporate the latest data.**

The PAIN
Pathway For The Management Of Acute Coronary Syndrome

St. Luke's Roosevelt — University Hospital of Columbia University College of Physicians & Surgeons

Continuum Health Partners, Inc.

CHEST PAIN EQUIVALENT
- Dyspnea
- Jaw or neck discomfort
- Epigastric discomfort
- Back (interscapular) discomfort
- Left shoulder, elbow or arm discomfort

CHEST PAIN or CHEST PAIN EQUIVALENT

Non-ACS Chest Pain:
- Aortic Dissection
- Pericarditis/Pericardial Effusion
- Pulmonary Emboli
- Aortic Stenosis
- Hypertrophic Cardiomyopathy

Consider immediate echocardiogram
Evaluate and treat accordingly

1. Initial Assessment : 12-lead EKG within 10 minutes, Vital signs, H&P
2. Consider Non-ACS chest pain
3. Labs: CBC, Basic Metabolic Panel, Cardiac Markers, (CPK, CPK-MB,Troponin) PT, PTT, INR, MG, Lipid profile
4. Patient MUST fall into one letter of the acronym P A I N

P PRIORITY

Chest Pain ≥ 30 min with:
- ≥ 1mm ST elevation in ≥ 2 contiguous leads or
- New LBBB or
- Acute Posterior wall MI (ST depression in leads V1-V3)

Give :
- IV
- O2
- Plavix 300mg PO x1
- ASA 325mg PO - chewed stat
- NTG IV or SL
- Beta Blocker IV (if no contraindication)
- High dose statin (Lipitor 80 mg PO)
- Heparin (unfractionated or enoxaparin)

Duration of Symptoms < 12 hours?

YES → On site PCI capability and door to balloon time < 90 min or Cardiogenic Shock?

NO → Ongoing chest pain?

Ongoing chest pain? NO → Meets Thrombolytic eligibility? (no contraindication)

Meets Thrombolytic eligibility? NO → Lytic (TNK)

On site PCI capability and door to balloon time < 90 min or Cardiogenic Shock? YES → Activate MI team

Ongoing chest pain? YES → Activate MI team

Lytic (TNK) NO → Activate MI team

Activate MI team

Start Gp IIb-IIIa inhibitor and transfer immediately to the cath lab for revascularization

Admit to CCU

- Echocardiogram
  Evaluate LV function
- Secondary Prevention
  - ASA
  - Plavix
  - Beta Blocker
  - High dose statin
  - ACE inhibitors/ARB's
- Life Style Modification: Exercise · Weight and diet control · Smoking cessation

A ADVANCED RISK / I INTERMEDIATE RISK

Typical Anginal Symptoms
- Prolonged symptoms (> 20 min) relieved by nitro or rest
- Symptoms at rest
- Accelerated chest pain in prior 48 hours

Is there evidence of:
- Dynamic ST shifts (> 0.5 mm) and / or
- Elavated troponin > 0.2 ng/ml

YES →

Give :
- ASA 325mg PO x1
- Plavix 300mg PO x1
- Heparin (unfractionated or enoxaparin)
- Beta Blockers (if no contraindication)
- NTG IV or SL
- GP IIb-IIIa inhibitors
- Statin

Admit to CCU

Early Catheterization (within 12 -72 hours) and revascularization (PCI/ CABG) if neccesary

NO →

Give :
- ASA 325mg PO x1
- Heparin (unfractionated or enoxaparin)
- Beta Blockers (if no contraindication)

Admit to telemetry

Is there evidence of evolving ST changes or positive cardiac markers?

YES → Early Catheterization (within 12 -72 hours) and revascularization (PCI/ CABG) if neccesary

NO → Is there evidence of any of the following high risk features?
- New or worsening CHF symptoms
- Malignant ventricular arrythmias
- Hemodynamic instability
- Recent PCI or CABG

Is there evidence of any of the following high risk features? YES → Early Catheterization (within 12 -72 hours) and revascularization (PCI/ CABG) if neccesary

Is there evidence of any of the following high risk features? NO → Imaging stress testing (echo, nuclear)

Imaging stress testing (echo, nuclear) → Is there evidence of significant ischemia on stres test?

Is there evidence of significant ischemia on stres test? YES → Cardiology consult Refer for cardiac cath

Is there evidence of significant ischemia on stres test? NO → Discharge home and risk factor modification

N NEGATIVE or LOW RISK

- Atypical syndrome with limited CP (< 20 min)
- ECG normal or without ischemic changes during pain
- Cardiac markers not elevated

- ASA
- NTG prn
- F/U EKG
- F/U cardiac markers

Admit to medical floor or chest pain unit

- Primary Prevention:
  Consider:
  - ASA
  - Statin
  - Beta Blocker
  - ACE inhibitors/ARB's
- Life Style Modification:
  - Exercise
  - Weight and diet control
  - Smoking cessation

The PAIN

Pathway For The Management Of Acute Coronary Syndrome

St. Luke's Roosevelt

University Hospital of Columbia University College of Physicians & Surgeons

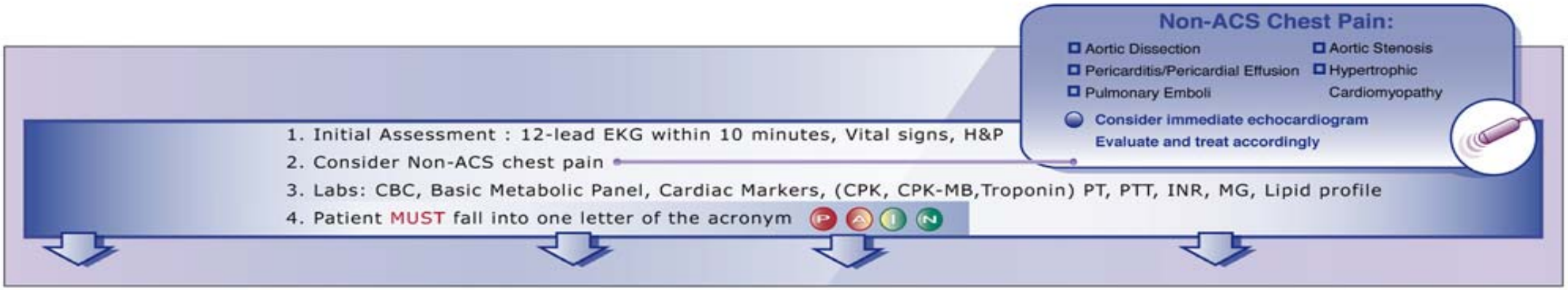
Continuum Health Partners, Inc.

CHEST PAIN EQUIVALENT

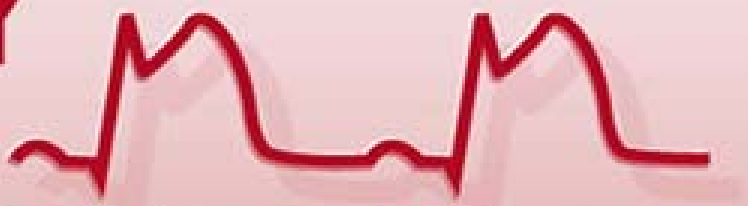
- Dyspnea
- Jaw or neck discomfort
- Epigastric discomfort
- Back (interscapular) discomfort
- Left shoulder, elbow or arm discomfort

CHEST PAIN or CHEST PAIN EQUIVALENT

Pathway


Non-ACS Chest Pain:
Aortic Dissection
Pericarditis/Pericardial Effusion
Pulmonary Emboli
Aortic Stenosis
Hypertrophic Cardiomyopathy
Consider immediate echocardiogram
Evaluate and treat accordingly
1. Initial Assessment : 12-lead EKG within 10 minutes, Vital signs, H&P
2. Consider Non-ACS chest pain
3. Labs: CBC, Basic Metabolic Panel, Cardiac Markers, (CPK, CPK-MB,Troponin) PT, PTT, INR, MG, Lipid profile
4. Patient MUST fall into one letter of the acronym
P
A
I
N

P PRIORITY



Chest Pain ≥ 30 min with:

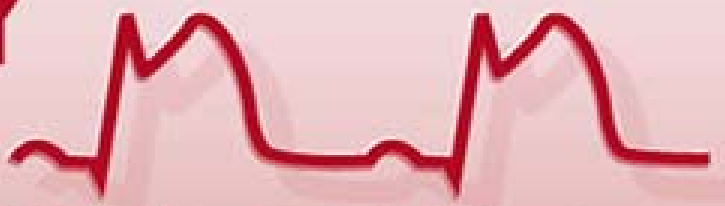
- **≥ 1mm ST elevation in ≥ 2 contiguous leads or**
- **New LBBB or**
- **Acute Posterior wall MI (ST depression in leads V_1-V_3)**

Give :

- IV
- O2
- Plavix 300mg PO x1
- ASA 325mg PO - chewed stat
- NTG IV or SL
- Beta Blocker IV (if no contraindication)
- High dose statin (Lipitor 80 mg PO)
- Heparin (unfractionated or enoxaparin)

Pathway

P PRIORITY



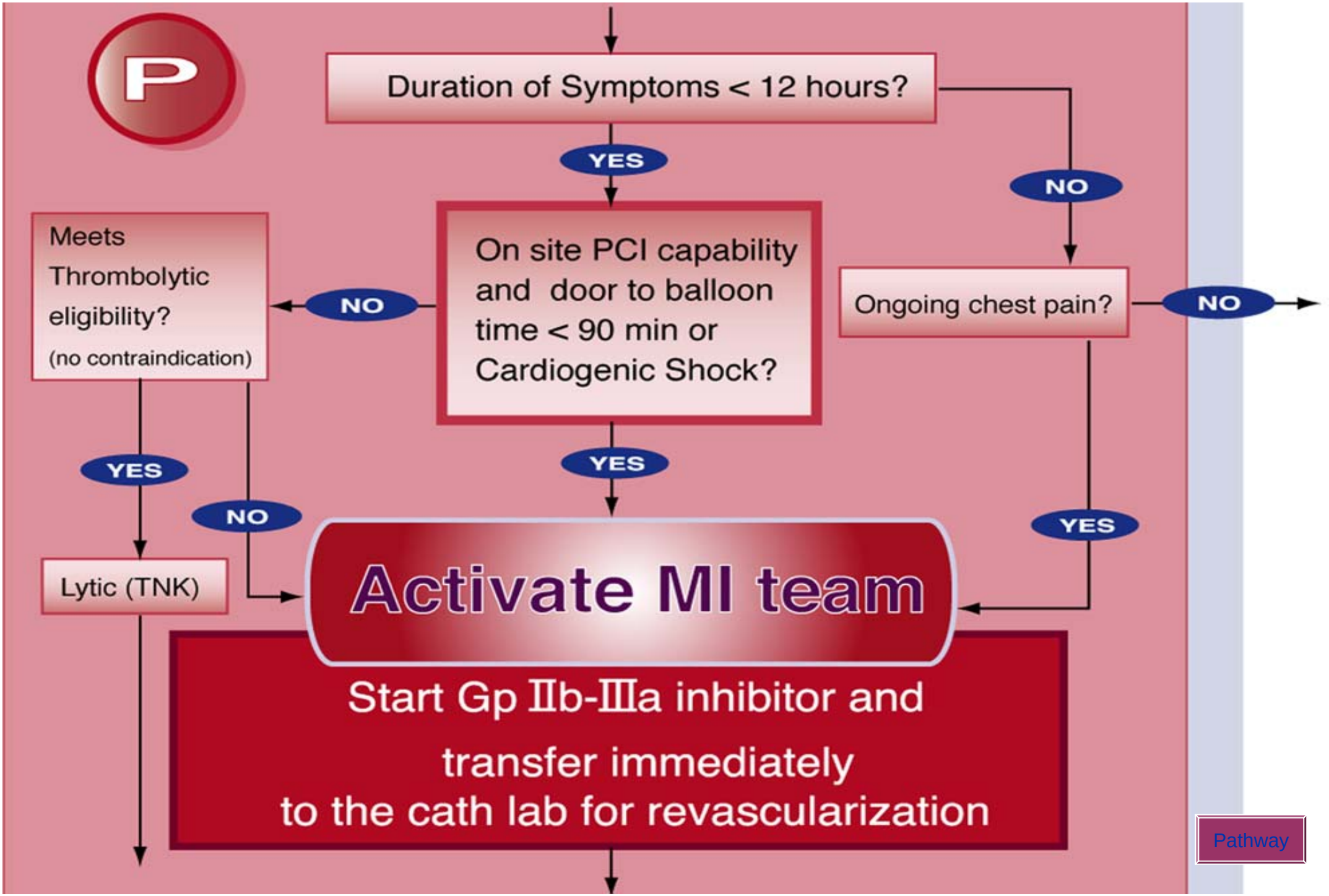
Chest Pain ≥ 30 min with:

- **≥ 1mm ST elevation in ≥ 2 contiguous leads or**
- **New LBBB or**
- **Acute Posterior wall MI (ST depression in leads V_1-V_3)**

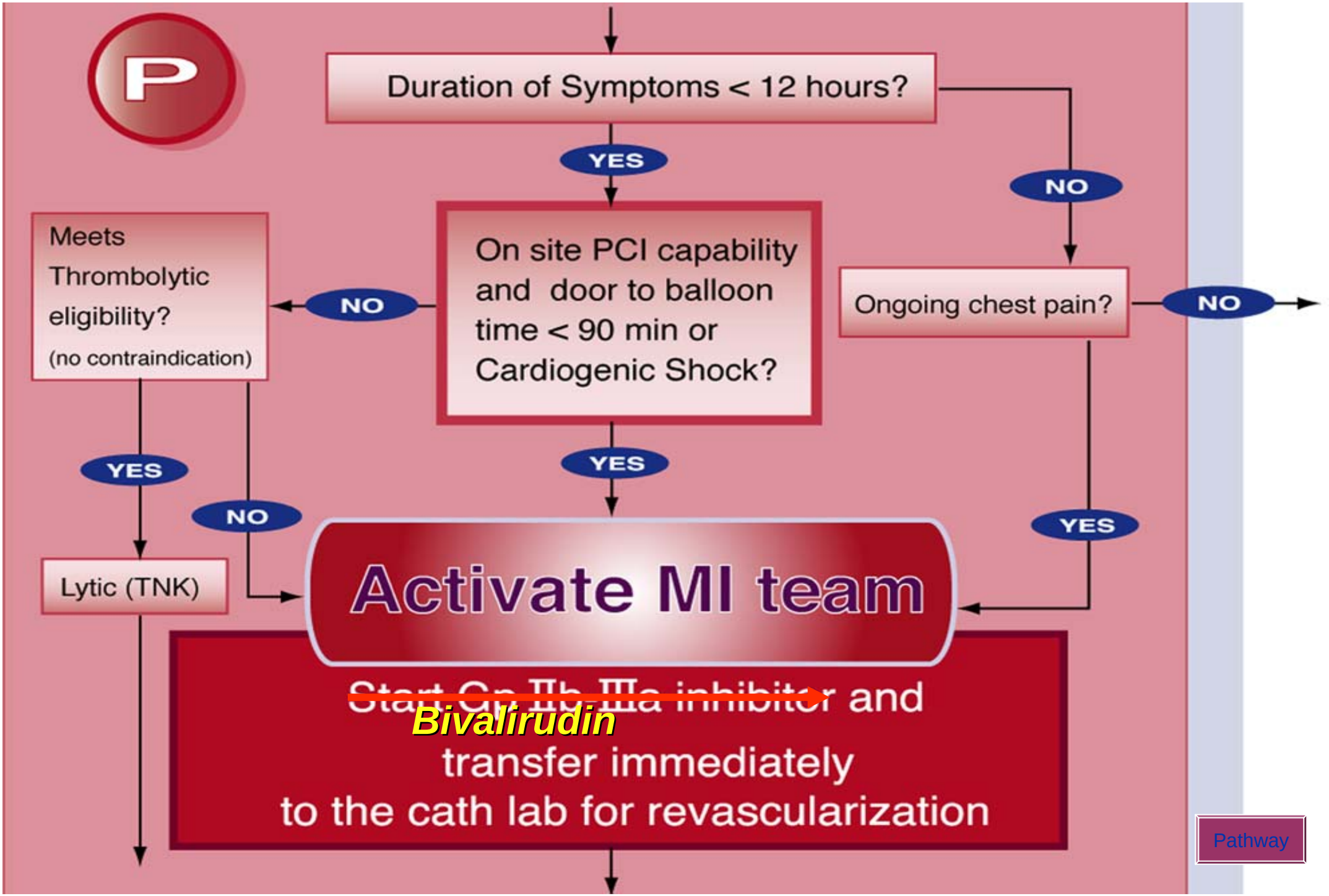
Give :

- IV
- O2
- ~~Plavix 300mg PO x1~~ **Prasugrel**
- ASA 325mg PO - chewed stat
- NTG IV or SL
- Beta Blocker IV (if no contraindication)
- High dose statin (Lipitor 80 mg PO)
- Heparin (unfractionated or enoxaparin)

Pathway


P
Duration of Symptoms < 12 hours?
YES
NO
Meets Thrombolytic eligibility? (no contraindication)
NO
On site PCI capability and door to balloon time < 90 min or Cardiogenic Shock?
Ongoing chest pain?
NO
YES
YES
NO
YES
Lytic (TNK)
Activate MI team
Start Gp IIb-IIIa inhibitor and transfer immediately to the cath lab for revascularization

Pathway


P
Duration of Symptoms < 12 hours?
YES
NO
Meets Thrombolytic eligibility? (no contraindication)
NO
On site PCI capability and door to balloon time < 90 min or Cardiogenic Shock?
Ongoing chest pain?
NO
YES
YES
NO
YES
Lytic (TNK)
Activate MI team
Start GP IIb-IIIa inhibitor and
Bivalirudin
transfer immediately
to the cath lab for revascularization

Pathway

P

Admit to CCU

- **Life Style Modification:** •Exercise •Weight and diet control •Smoking cessation

- **Echocardiogram**
  Evaluate LV function

A

- **Secondary Prevention**
  - •ASA
  - •Plavix
  - •Beta Blocker
  - •High dose statin
  - •ACE inhibitors/ARB's

ADVANCED RISK

INTERMEDIATE RISK

Typical Anginal Symptoms

- Prolonged symptoms (> 20 min) relieved by nitro or rest
- Symptoms at rest
- Accelerated chest pain in prior 48 hours

Is there evidence of:

- ☐ Dynamic ST shifts (> 0.5 mm) and / or
- ☐ Elavated troponin > 0.2 ng/ml

YES

NO

Pathway

A

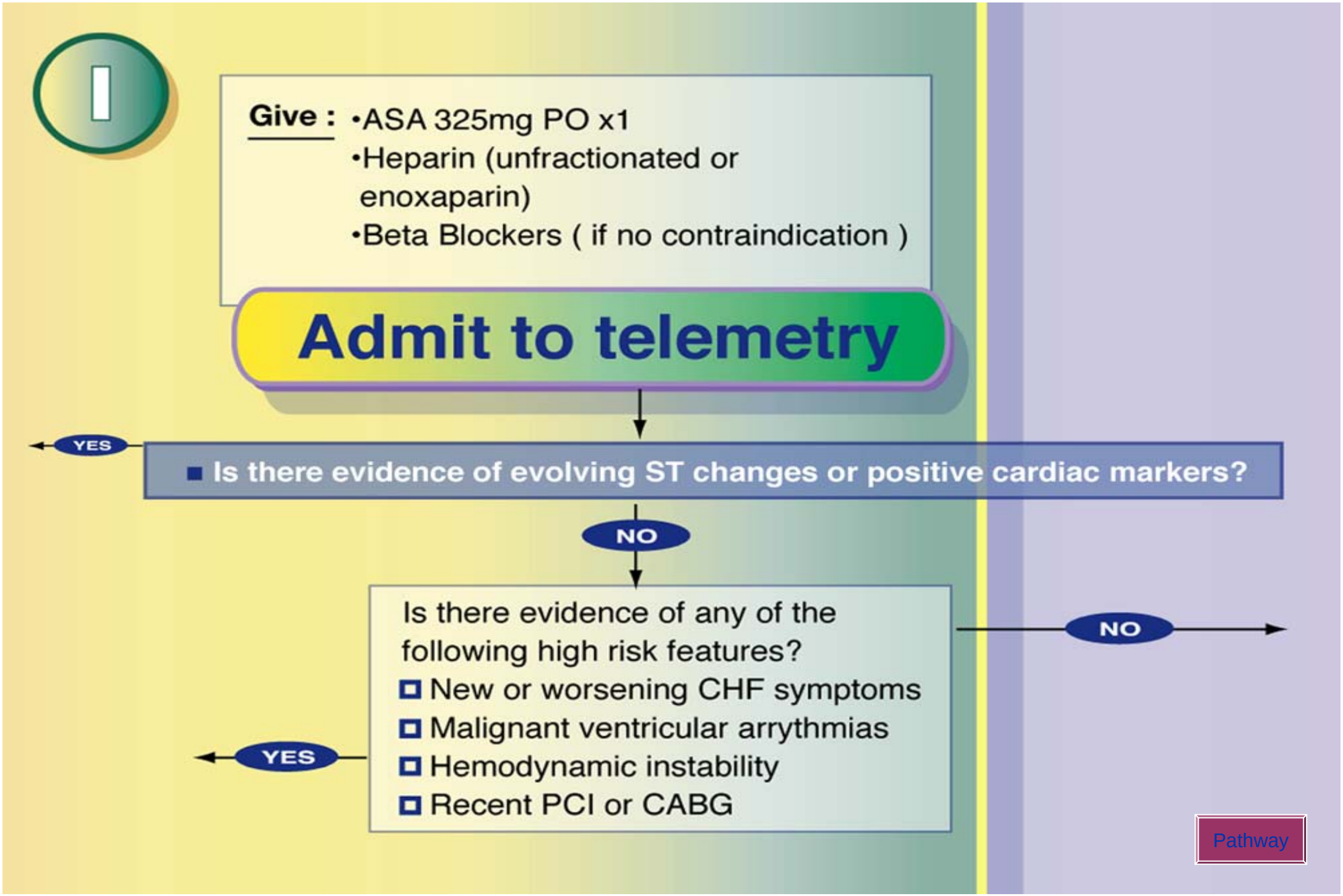
Give :

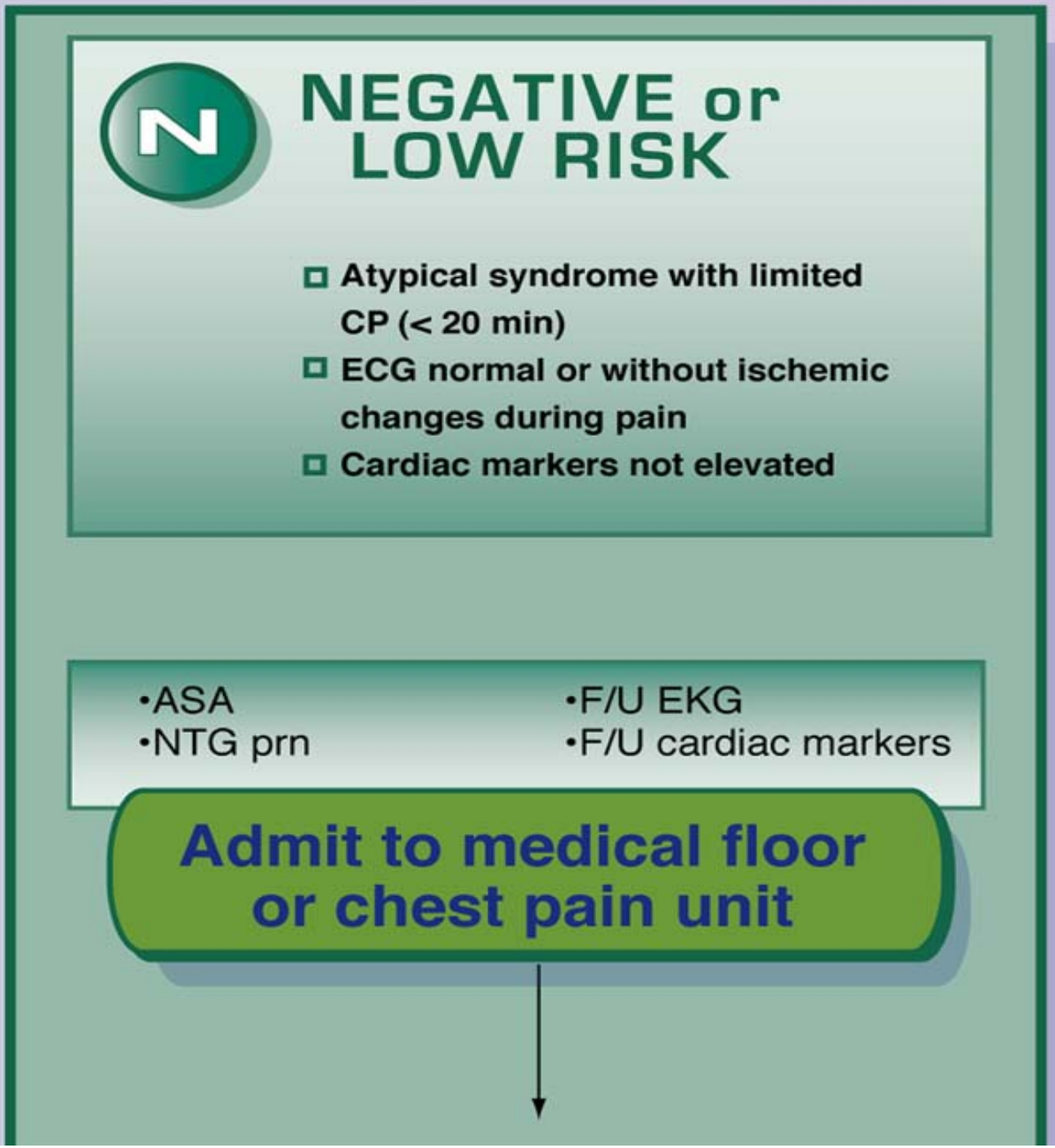
- ASA 325mg PO x1
- Plavix 300mg PO x1
- Heparin (unfractionated or enoxaparin)
- Beta Blockers (if no contraindication)
- NTG IV or SL
- GP IIb-IIIa inhibitors
- Statin

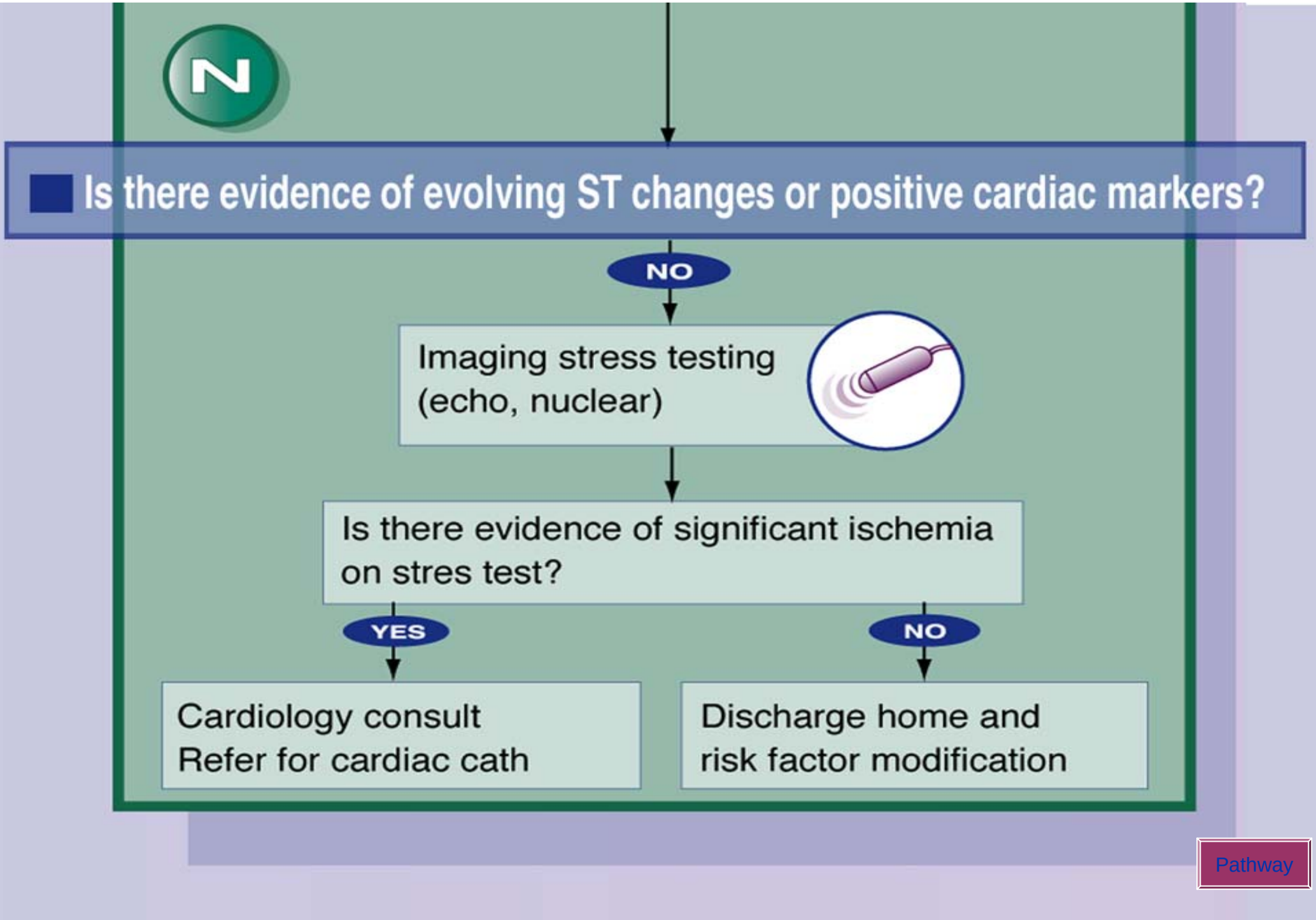
Admit to CCU

Early Catheterization (within 12 -72 hours) and revascularization (PCI/ CABG) if neccesary

Pathway


I
Give : •ASA 325mg PO x1
•Heparin (unfractionated or enoxaparin)
•Beta Blockers (if no contraindication)
Admit to telemetry
YES
Is there evidence of evolving ST changes or positive cardiac markers?
NO
Is there evidence of any of the following high risk features?
New or worsening CHF symptoms
Malignant ventricular arrythmias
Hemodynamic instability
Recent PCI or CABG
YES
NO
Pathway


N
NEGATIVE or LOW RISK
Atypical syndrome with limited CP (< 20 min)
ECG normal or without ischemic changes during pain
Cardiac markers not elevated
•ASA
•NTG prn
•F/U EKG
•F/U cardiac markers
Admit to medical floor or chest pain unit


N
Is there evidence of evolving ST changes or positive cardiac markers?
NO
Imaging stress testing
(echo, nuclear)
Is there evidence of significant ischemia
on stres test?
YES
NO
Cardiology consult
Refer for cardiac cath
Discharge home and
risk factor modification

Pathway

- **Primary Prevention:**

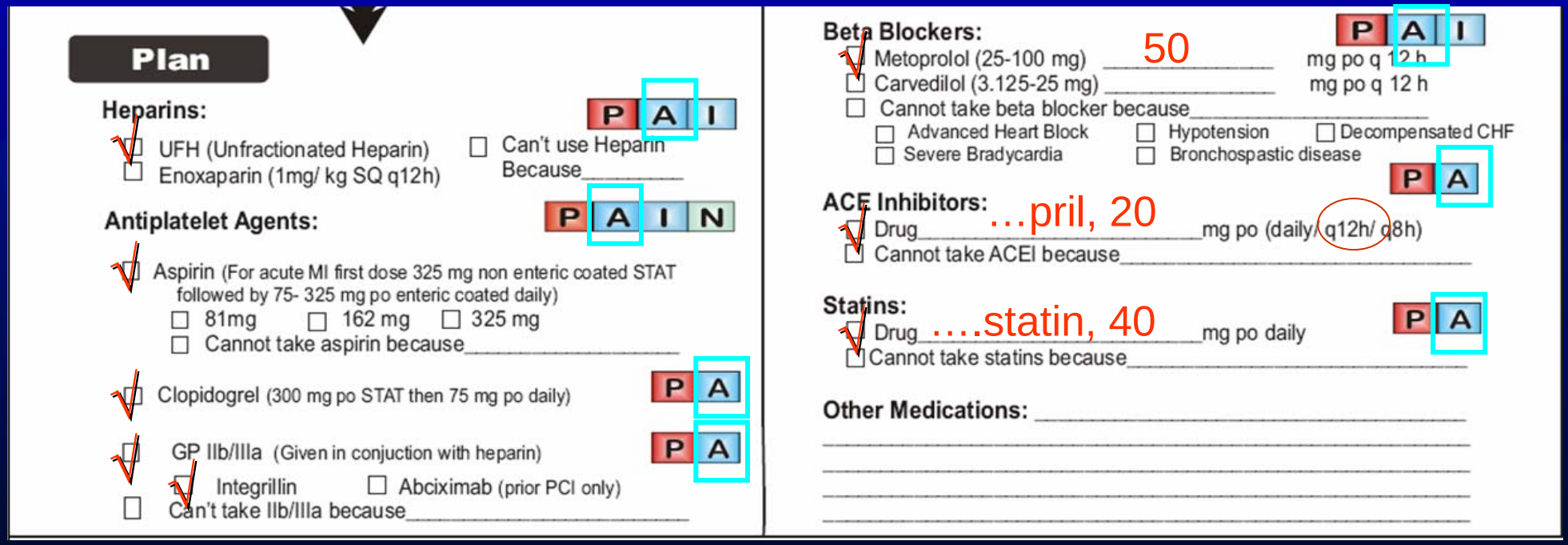
  Consider:
  - ASA
  - Statin
  - Beta Blocker
  - ACE inhibitors/ARB's

- **Life Style Modification:**
  - Exercise
  - Weight and diet control
  - Smoking cessation

Pathway

Color Coded Admission Order Set

Initial treatment plan according to the PAIN letters



Plan

Heparins: P A I

- √ ☐ UFH (Unfractionated Heparin)
- ☐ Enoxaparin (1mg/ kg SQ q12h)
- ☐ Can't use Heparin Because_____

Antiplatelet Agents: P A I N

- √ ☐ Aspirin (For acute MI first dose 325 mg non enteric coated STAT followed by 75- 325 mg po enteric coated daily)
  - ☐ 81mg ☐ 162 mg ☐ 325 mg
  - ☐ Cannot take aspirin because_____
- √ ☐ Clopidogrel (300 mg po STAT then 75 mg po daily) P A
- √ ☐ GP IIb/IIIa (Given in conjuction with heparin) P A
  - √ ☐ Integrillin ☐ Abciximab (prior PCI only)
  - ☐ Can't take IIb/IIIa because_____

Beta Blockers: P A I

- √ ☐ Metoprolol (25-100 mg) 50 mg po q 12 h
- ☐ Carvedilol (3.125-25 mg) _____ mg po q 12 h
- ☐ Cannot take beta blocker because_____
  - ☐ Advanced Heart Block ☐ Hypotension ☐ Decompensated CHF
  - ☐ Severe Bradycardia ☐ Bronchospastic disease

ACE Inhibitors: P A

- √ ☐ Drug …pril, 20 mg po (daily/ q12h/ q8h)
- ☐ Cannot take ACEI because_____

Statins: P A

- √ ☐ Drug ….statin, 40 mg po daily
- ☐ Cannot take statins because_____

Other Medications: _____

Guided Discharge summaries

Patient discharge instructions
Including Smoking cessation
And exercise advise and
Referral for cardiac rehab if
Required.

I have been treated for chest pain and/or heart failure. For the improvement of hospital care and to follow up on the progress of my condition I agree to be called for followup over the next year.

Have you smoked in the last year (12 Months)? ☐ No ☐ Yes

☑ I have been advised to stop smoking. Information about smoking cessation including ongoing support, nicotine replacement and avoiding second hand smoke has been given to me.

☑ I have been advised to exercise 3-5 times a week for 30 mins a day.

☑ Referral for Cardiac Rehabilitation.

Patient's Signature:_____ Patient's Phone:_____

Date:_____

RN Signature:_____

Date:_____

House staff Name:_____

Signature:_____

Chest Pain Pathway Discharge Summary

Discharge Category:

☐ **P**riority ☑ **A**dvance ☐ **I**ntermediate ☐ **N**egative

Antiplatelet Agents: P A I N

☑ Aspirin (75- 325 mg po enteric coated daily)
☐ 81mg ☐ 162 mg ☑ 325 mg
☐ Cannot take aspirin because_____

☐ Clopidogrel (75 mg po daily) P A

Beta Blockers: P A I

☑ Metoprolol (25-100 mg) 50 mg po q 12 h
☐ Carvedilol (3.125-25 mg)_____ mg po q 12 h
☐ Toprol XL (50-200 mg)_____ mg po daily
☐ Cannot take beta blocker because_____
☐ Advanced Heart Block ☐ Hypotension ☐ Decompensated CHF
☐ Severe Bradycardia ☐ Bronchospastic disease

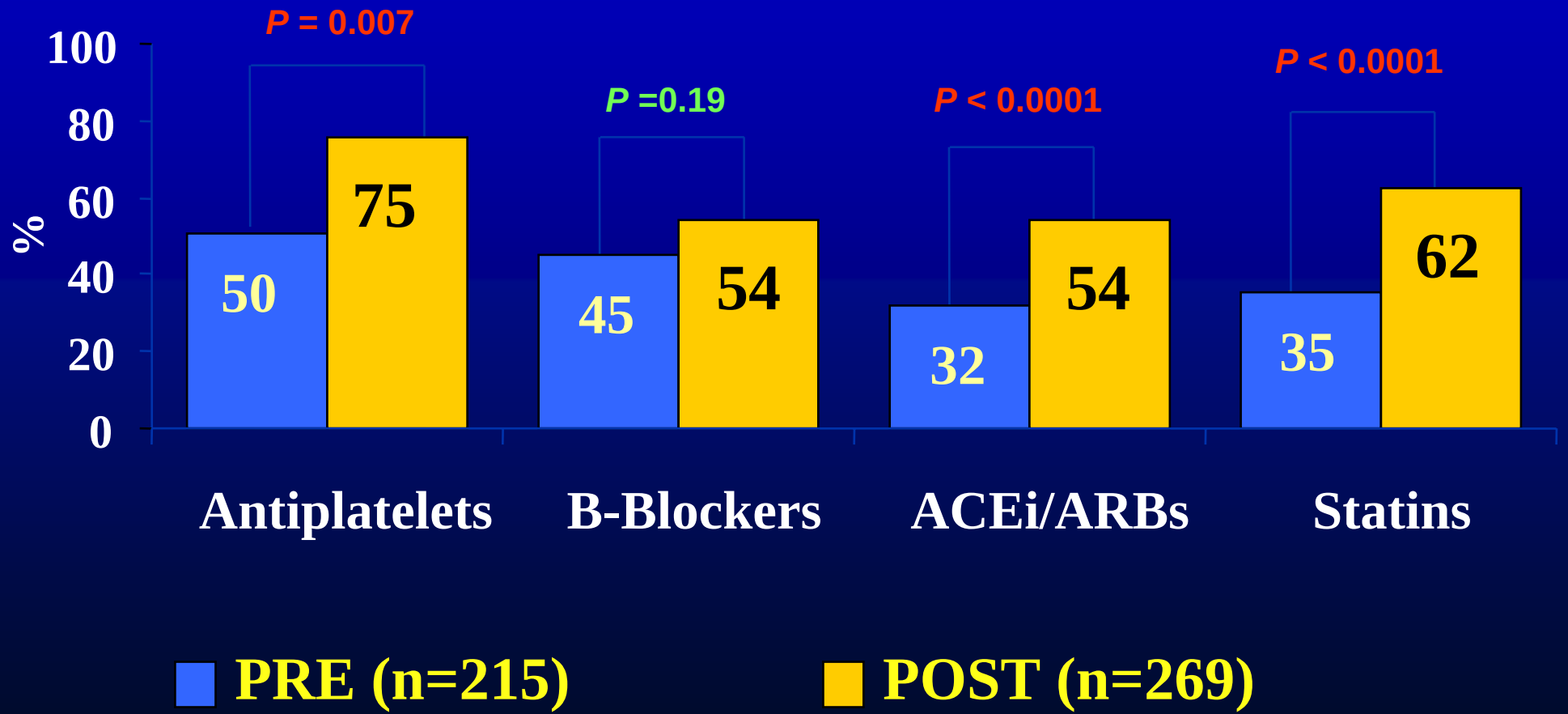
ACE Inhibitors: P A

☑ Drug …pril, 20 mg po (daily/ q12h/ q8h)
☐ Cannot take ACEI because_____

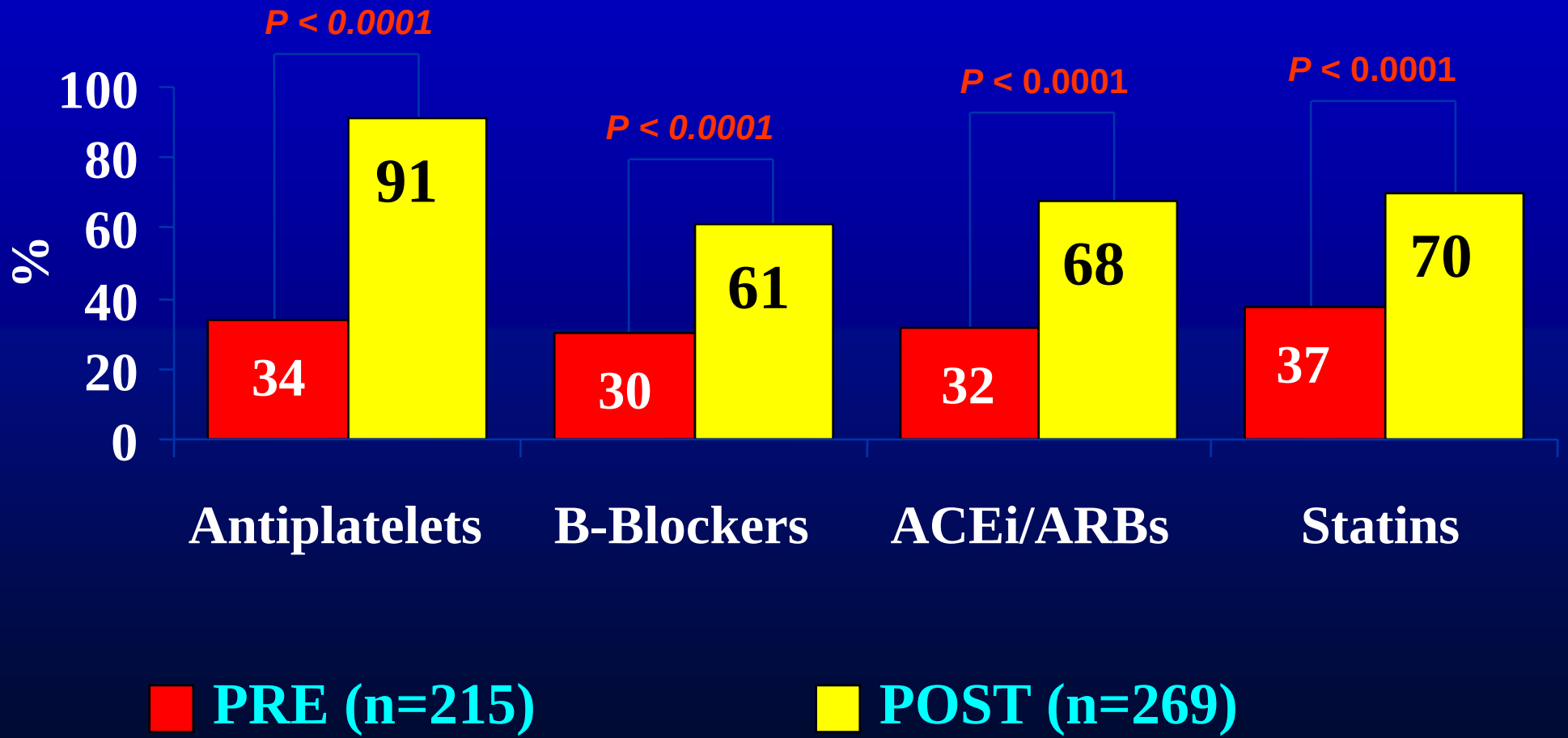
Statins: P A

☑ Drug …statin, 40 mg po daily
☐ Cannot take statins because_____

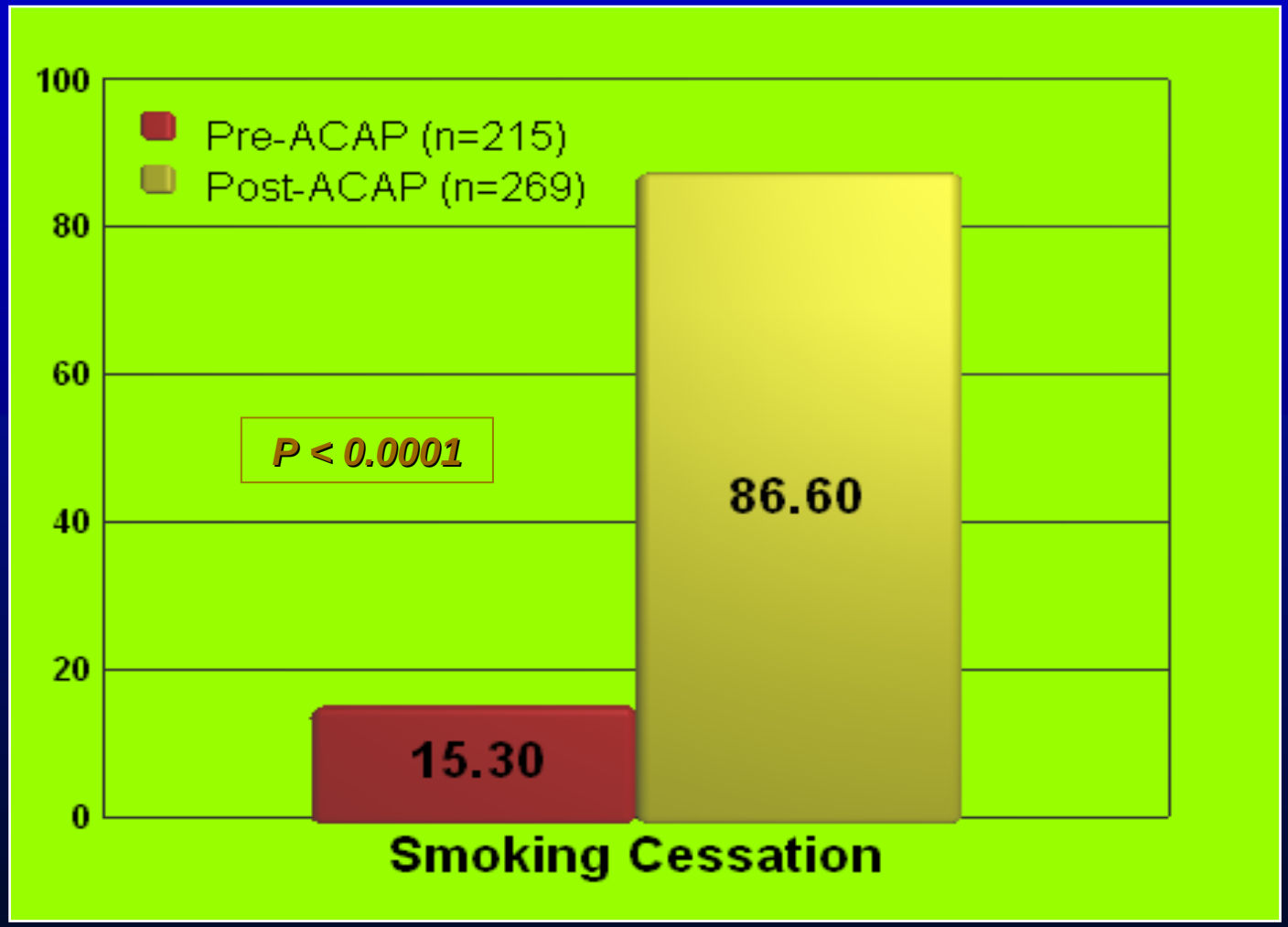
Effect on Admission Orders



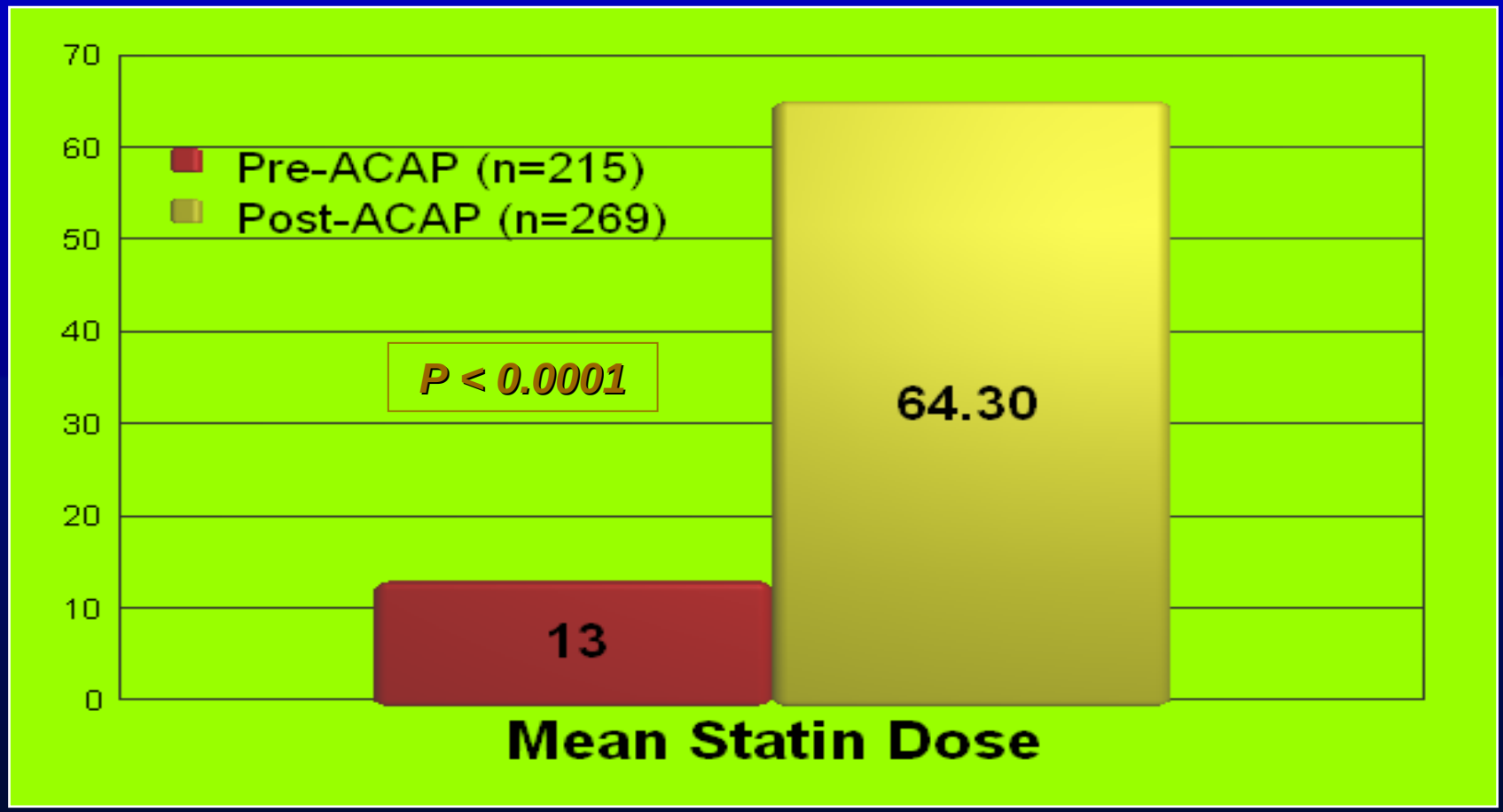
Effect on Discharge Orders



Effect on Discharge Orders



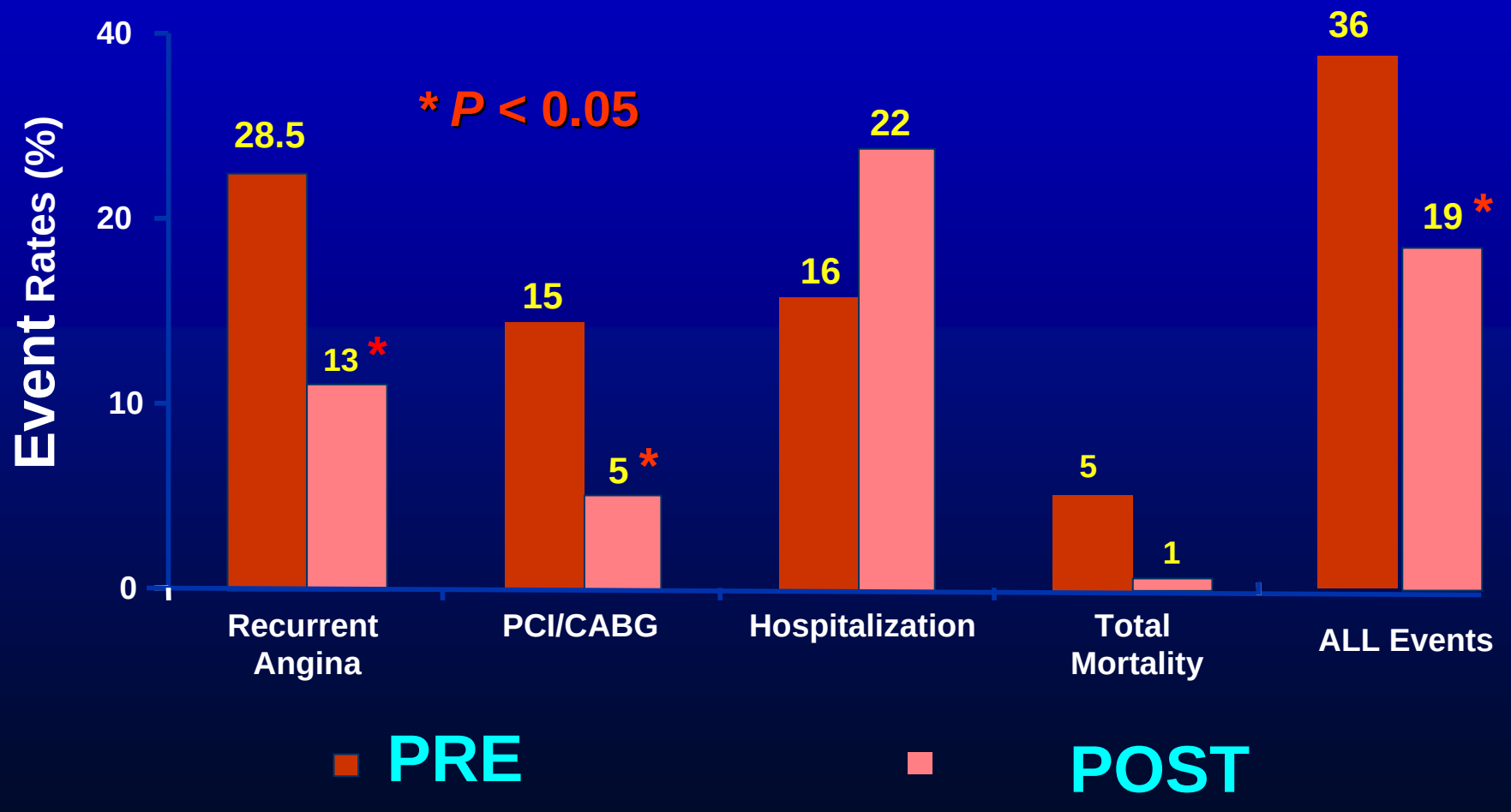
Mean Statin dose at Discharge



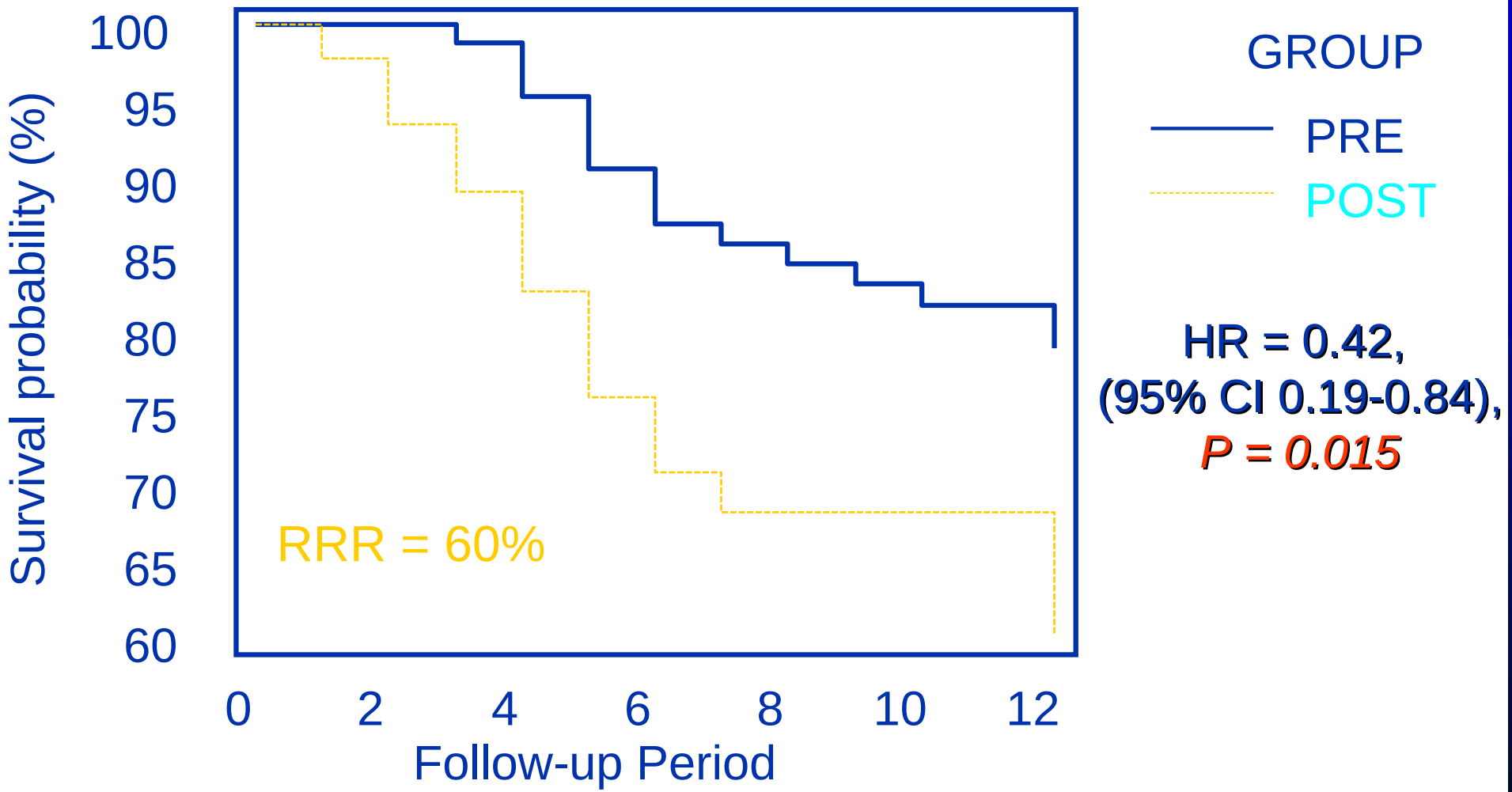
Treatment rates at One-Year Follow-up

	Pre-ACAP	Post-ACAP	
	(n=215)	*(n=269)*	*P*
12-month follow-up:			
Statin	**20%**	**84%**	*0.0001*
LDL < 100 mg/dL	**9%**	**47%**	*0.001*
Beta-Blocker	**21%**	**51%**	*0.001*
Aspirin	**36%**	**86%**	*0.001*

Clinical Events for the First Year After Discharge



Long-term Effect on Composite Endpoints



Conclusions

- **Pathway-based approach to acute coronary syndrome can provide a uniform management of patients and significantly improve the adherence to guidelines .**
- **This increased adherence to the guidelines can improve the outcomes of patients with acute coronary syndrome.**