

Chest Pain: To Cath or Not ?

Part I



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5/3/2000

A Typical Scenario...

- 57 year old female, Mrs. X., presents to your office with a 2 months history of exertional chest pressure, however she does admit that she also has the same feeling occasionally, although less severe, at rest. Symptoms resolve in 5 min most of the times without any intervention.
- She only has a history of HTN, her recent LDL is 130 and no other risk factors, no previous history of CAD.
- She is on Lisinopril and HRT.
- In your office her BP is 140/90, she has a normal physical exam and a normal ECG.

The easy part...

- You decide to start her on Aspirin and arrange for a ETT the next day.
- **ETT results:** 5 min 50 sec, achieved 85% of her MPHR , patient developed chest pressure similar to her initial complaint associated with 1 mm ST↓ in inferior leads ; she stopped the test secondary to fatigue.
- An Echocardiogram you ordered is normal...

The second visit is not always easier...



- What is wrong with me ?
- Can you fix it ?
- Will I live forever ?

Anatomy-driven or Ischemia driven decision ?

- Cardiology Consultation.
- Your patient is scheduled to have a ETT with Thallium.
- Metoprolol is added to the regimen. (No ! The dose is not complex...)

“Ischemia-guided” or “selective invasive approach”...

It will take me a while to know the anatomy!!!

ACC/AHA Coronary Angiography Guidelines

- Initially published in 1987.
- Intend to assist physicians in clinical decision making.
- Define practices that meet the needs of *most* patients in *most* circumstances.
- Last updated 5/1999.
- Closely linked to recent demands of Evidence - based Medicine.

Classification

- **I:** General agreement about usefulness/ efficacy.
- **II:** Conflicting evidence
 - Divergence of opinion.
 - IIa:** Evidence / Opinion is in favor.
 - IIb:** Less well established.
- **III:** Not useful / effective, may be harmful.

Level of Evidence

- **A:** Multiple randomized Clinical trials.
- **B:** Single randomized or non randomized trials.
- **C:** Expert Consensus.

Risks of cardiac catheterization

Unfortunately there are risks...

Major Predictors of Major Complications:



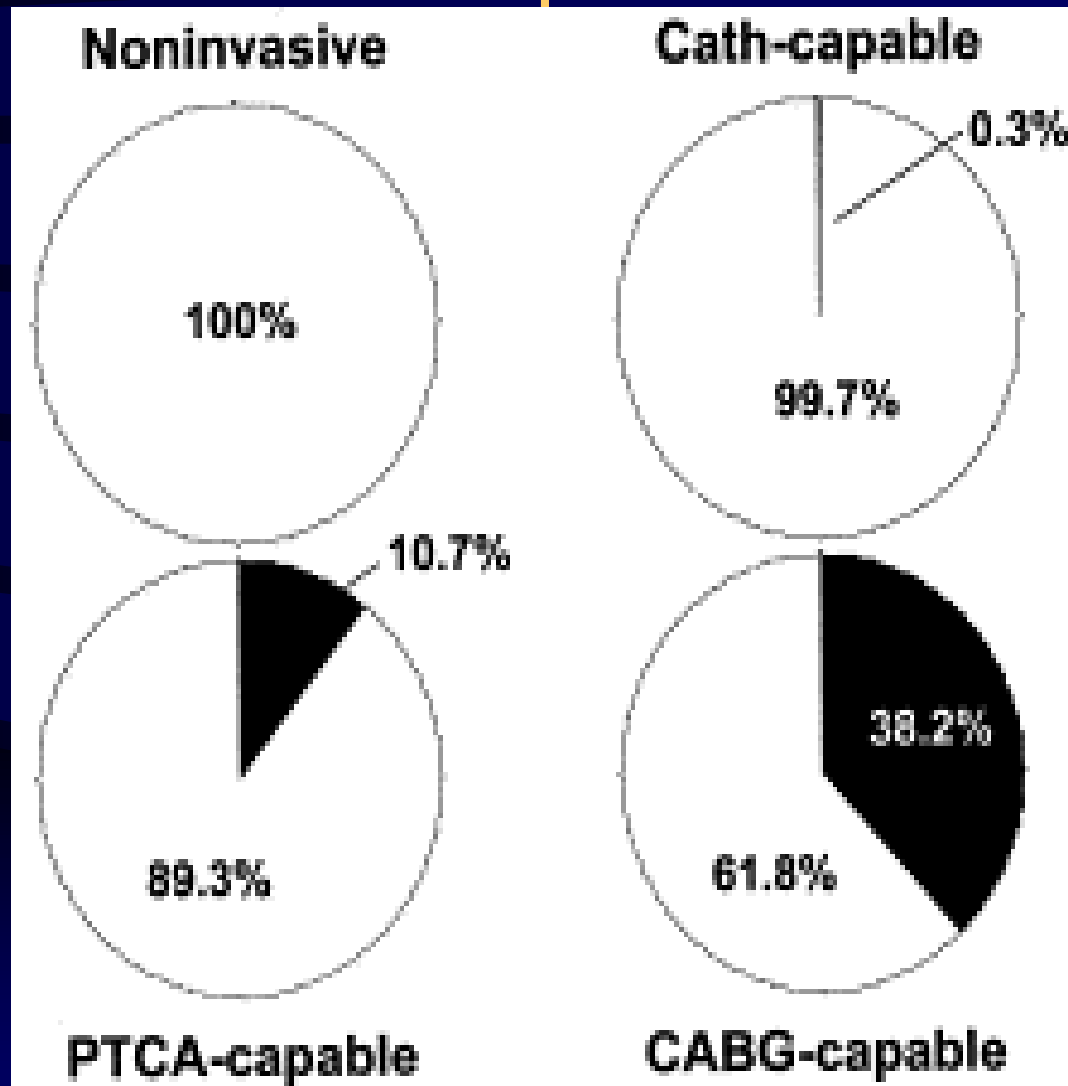
- Moribund condition.
- Shock.
- Acute MI < 24 hrs.
- Renal insufficiency.
- Cardiomyopathy.
- Aortic Valve disease.
- Mitral valve disease.
- CHF.

Utilization...

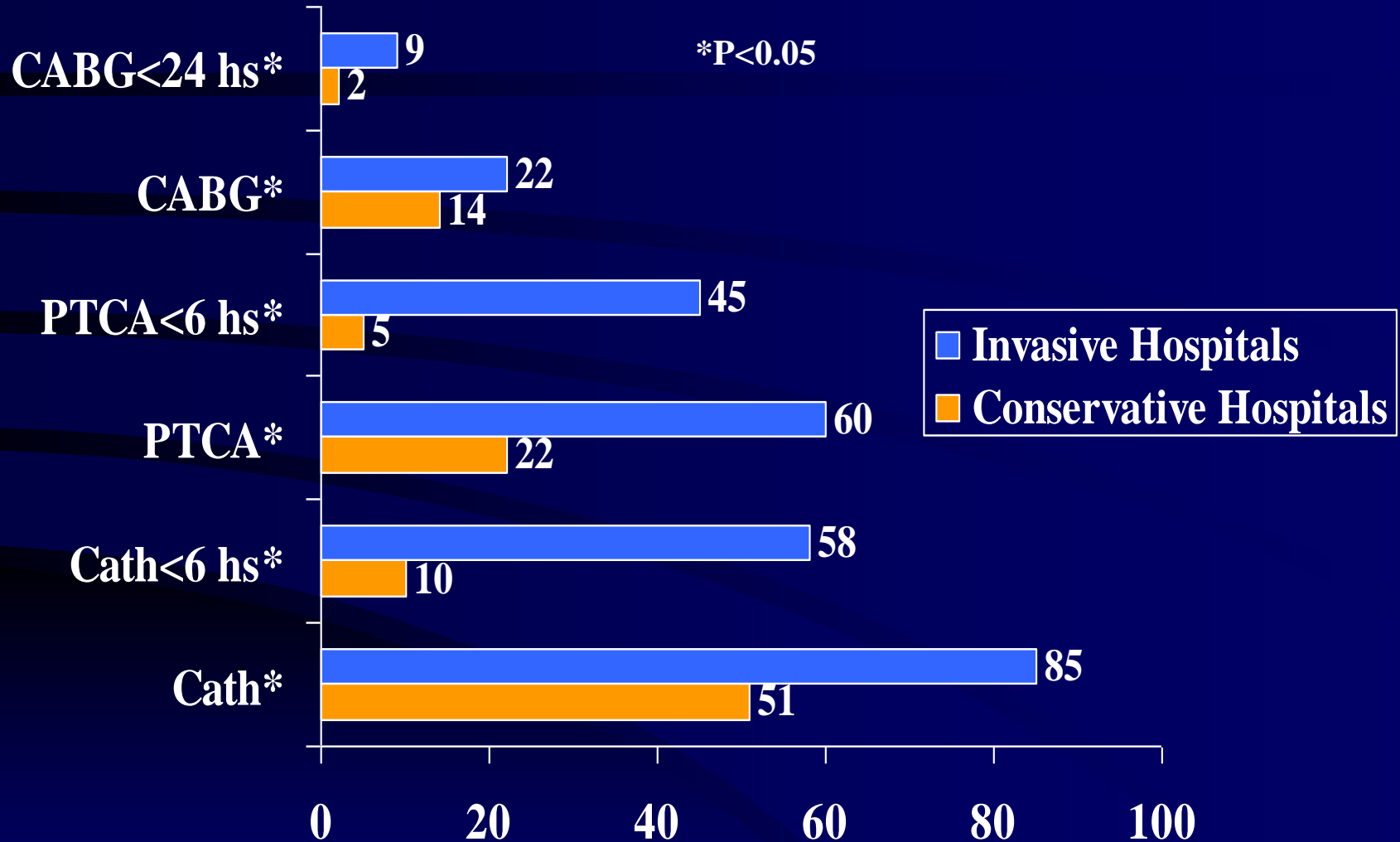
- 1993: 1,078,000 catheterizations annually.
- 48% in people > 65 years old.
- Men more likely than women.
- Whites more likely than blacks (114/100000).
- Medicare: 38% ↑ from 1991-1995.
- Given current trends and a prediction of 40% population growth, by 2010 ≈ 3 million catheterizations in the USA annually!!!

If you also consider that Greece follows the USA trends with a 10-15 years interval ... I will most likely have a good professional life!!!

Type of acute reperfusion in different types of hospitals

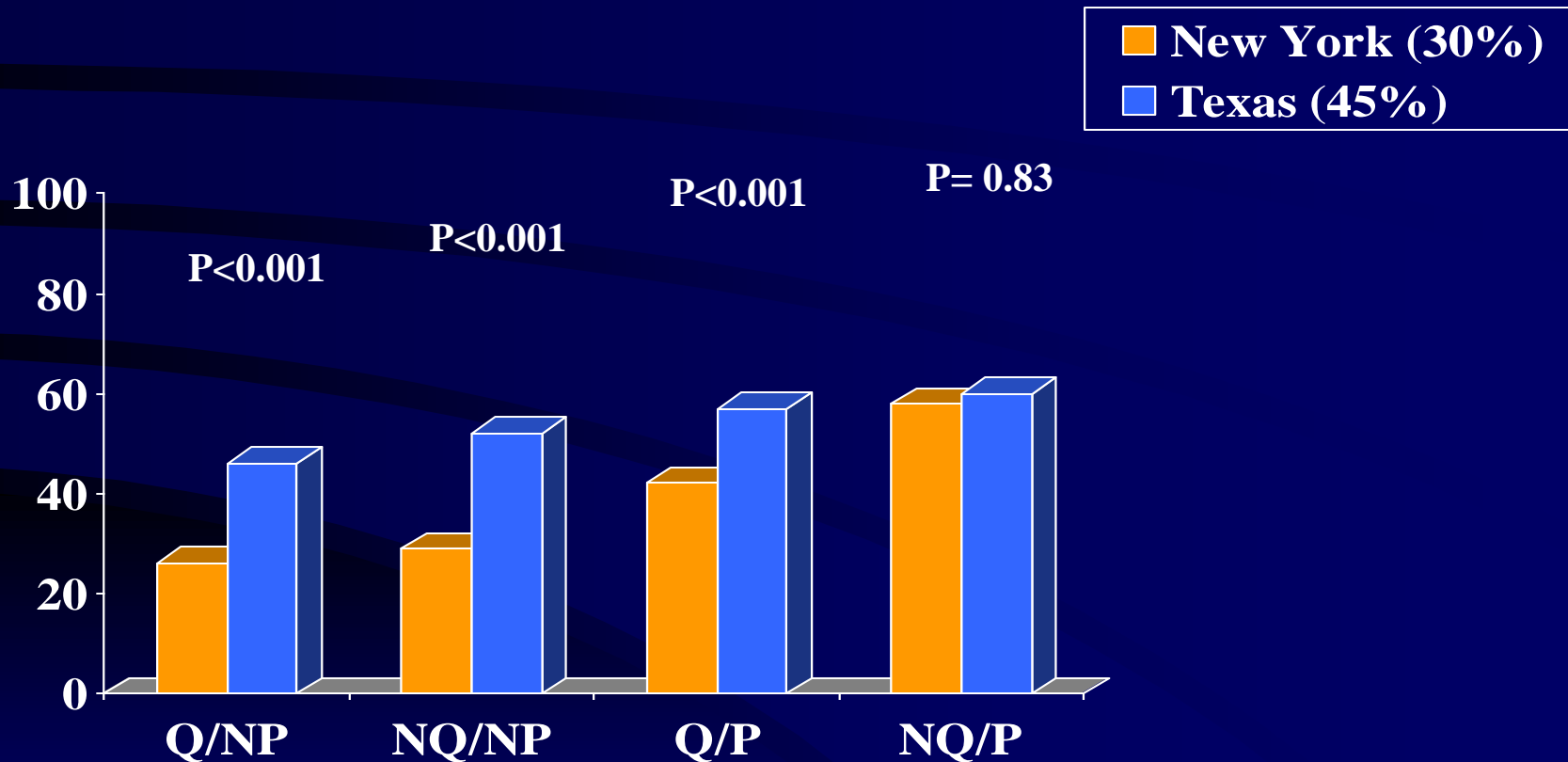


In-Hospital procedures in ACS



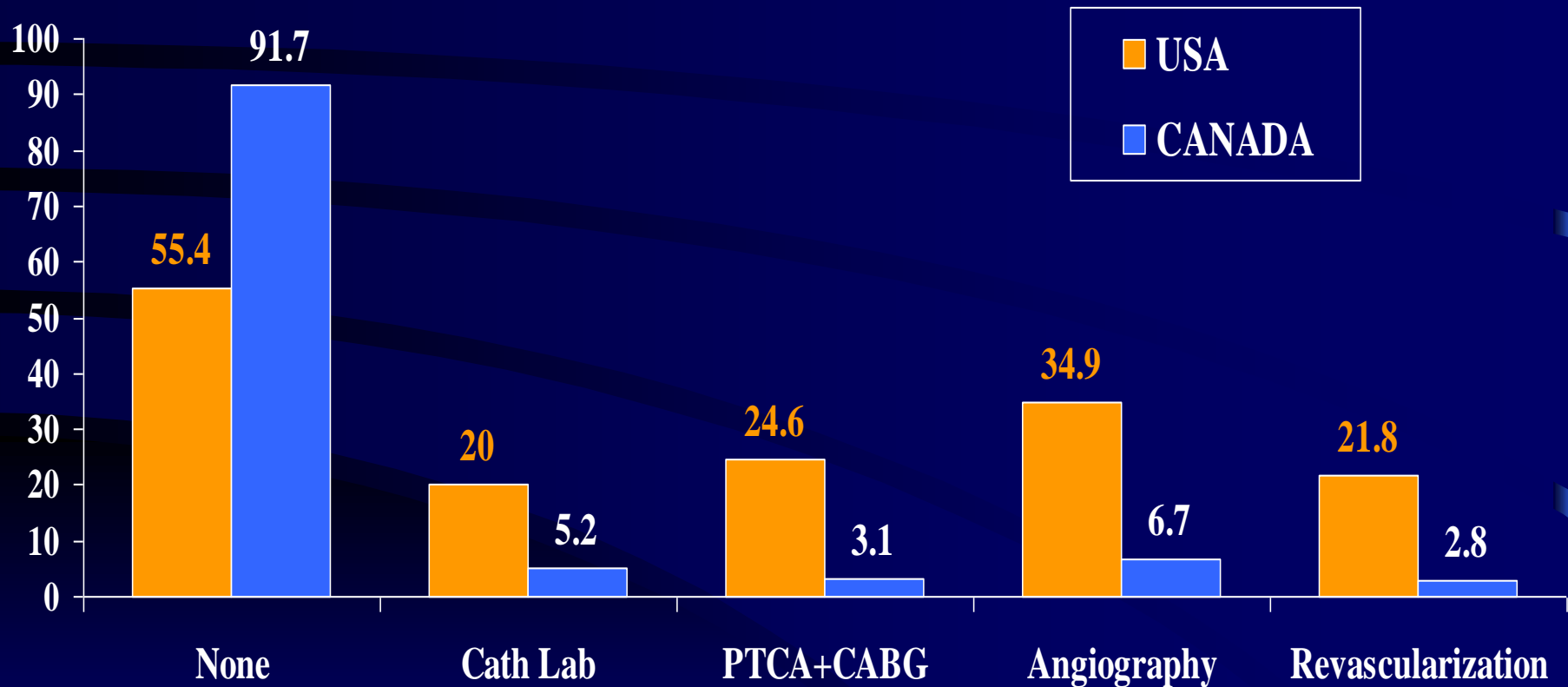
Use of Angiography within 90 days of Index Hospitalization for AMI

(No cumulative mortality difference!)

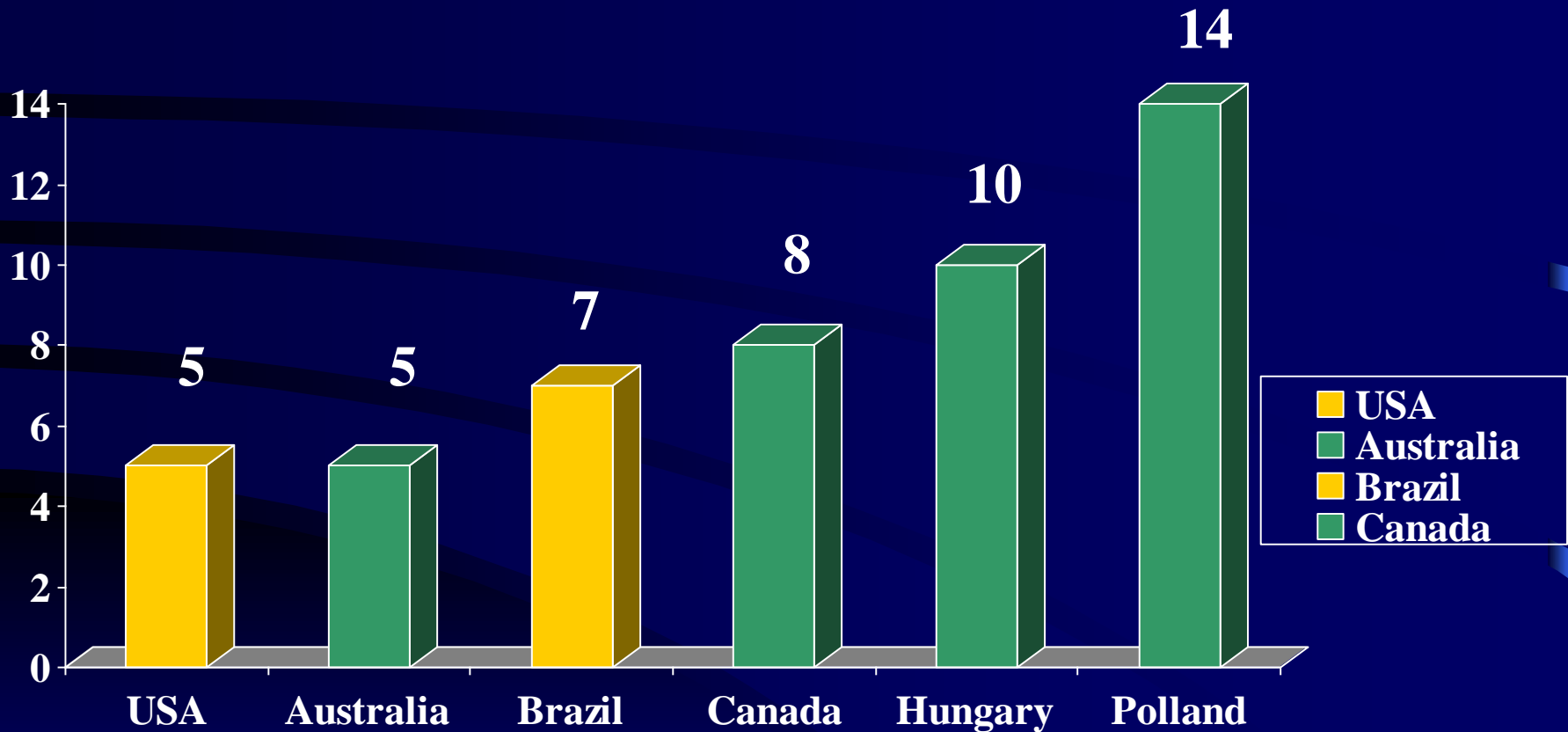


Characteristics of Hospitals in the USA and Ontario, Canada

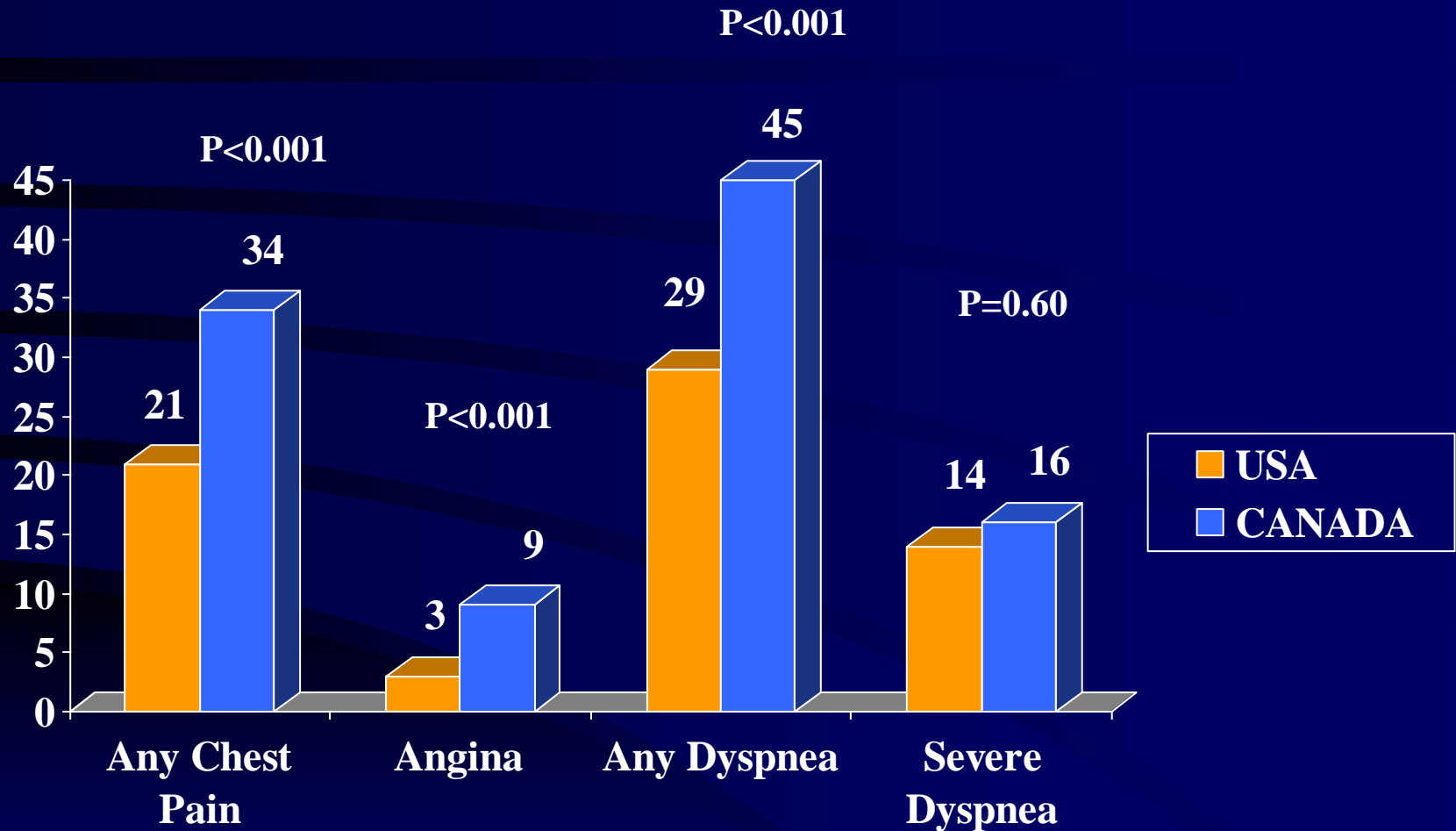
(No survival benefit in 1 year...)



OASIS Registry: Median in-hospital stays in days: Only ↓ in refractory angina (USA/Brazil)



Status of Cardiac symptoms at One year after MI



Cost - Effectiveness

Little studies...

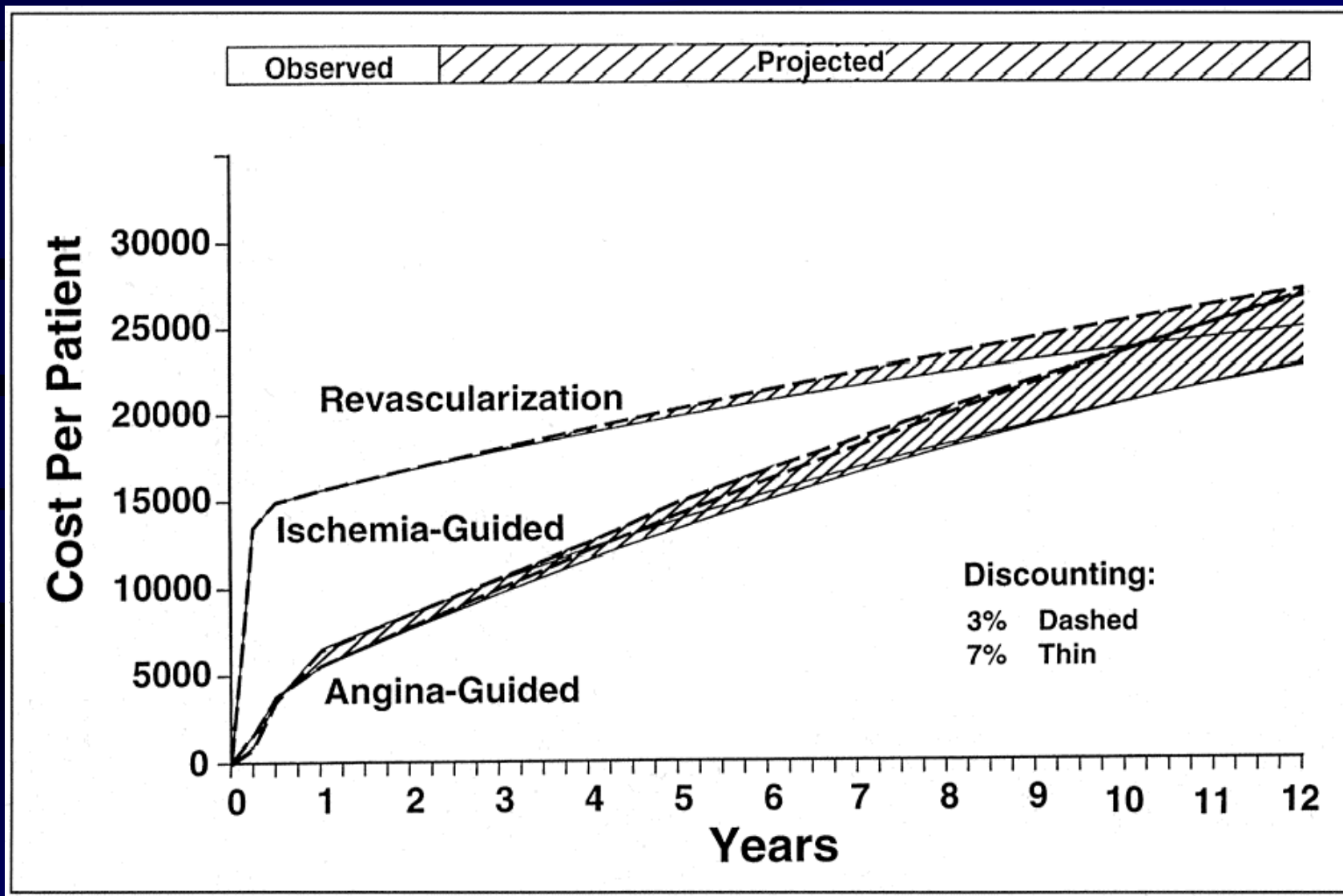
- Angiography is frequently coupled with a revascularization procedure.
- Stress PET shows the lowest cost per effect or per cost/QALY in patients with PCAD < 0.70 .
- At a pretest probability $> 70\%$ (middle aged man with typical angina) proceeding to angiography as the first test has the lower cost...

Estimated medical care Costs: ACIP Study

Items	Diagnosis Related Group Code	Hospital Cost (\$)	Physician Fee (\$)
Coronary bypass	106	19,092	3,223
Coronary angioplasty	112	6,635	1,356
Myocardial infarction, complicated	121	5,384	738
Myocardial infarction, fatal	123	4,745	199
Catheterization	124	4,137	400
Stroke	014	4,053	551
Other	No Code	3,908	353
Myocardial infarction, uncomplicated	122	3,807	327
Heart failure	127	3,440	444
Arrhythmia	138	2,702	292
Angina	140	2,098	248

*Death was coded as myocardial infarction, fatal (even if not hospitalized).
Highest cost for any event or procedure was assigned for each hospitalization using 1993 Medicare Diagnosis Related Group rates from North Carolina. For example, a patient with coronary bypass and myocardial infarction was assigned a cost for coronary bypass, not the combined cost of coronary bypass + myocardial infarction.
When no code existed for event or procedure it was listed as "other," and assigned a median value for hospital cost and physician fee among the 8 different categories.

Cumulative costs in stable CAD: ACIP Study



Am J Cardiology 1999;84:1311-1316.

Who needs an angiogram?



- ? A stable patient that has been unstable recently...
- ? An unstable patient that has been stabilized medically...
- It also matters who makes the decision...

Recommendations for angiography in the setting of known or suspected CAD

- High risk criteria on noninvasive testing regardless of anginal severity.
- CCS class III or IV angina on medical treatment.
- Cardiac arrest survivors, Sustained monomorphic or nonsustained polymorphic ventricular tachycardia.

Stable Angina

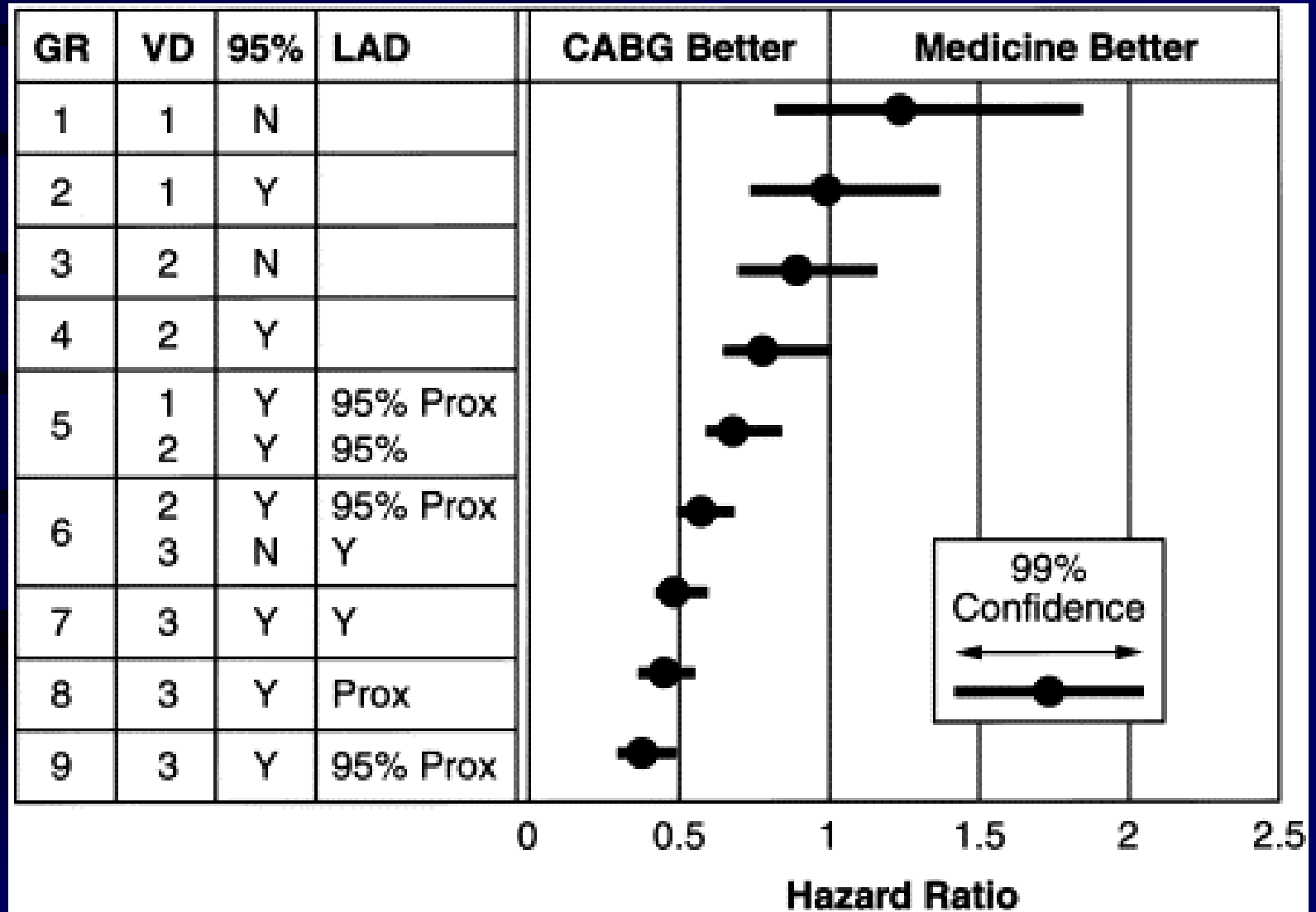
Noninvasive test results predicting high risk

- Severe resting LVEF ($< 35\%$).
- High risk treadmill score (score < -11).
- Severe exercise left ventricular dysfunction ($< 35\%$).
- Stress induced large perfusion defect (particularly anterior).
- Stress induced multiple moderate perfusion defects.
- Large, fixed defect with LV dilatation or \uparrow lung uptake.
- Echocardiographic wall motion abnormality at low dose of dobutamine (< 10 mg/kg/min) or low heart rate (< 120 bpm).
- Stress Echo evidence of extensive ischemia.

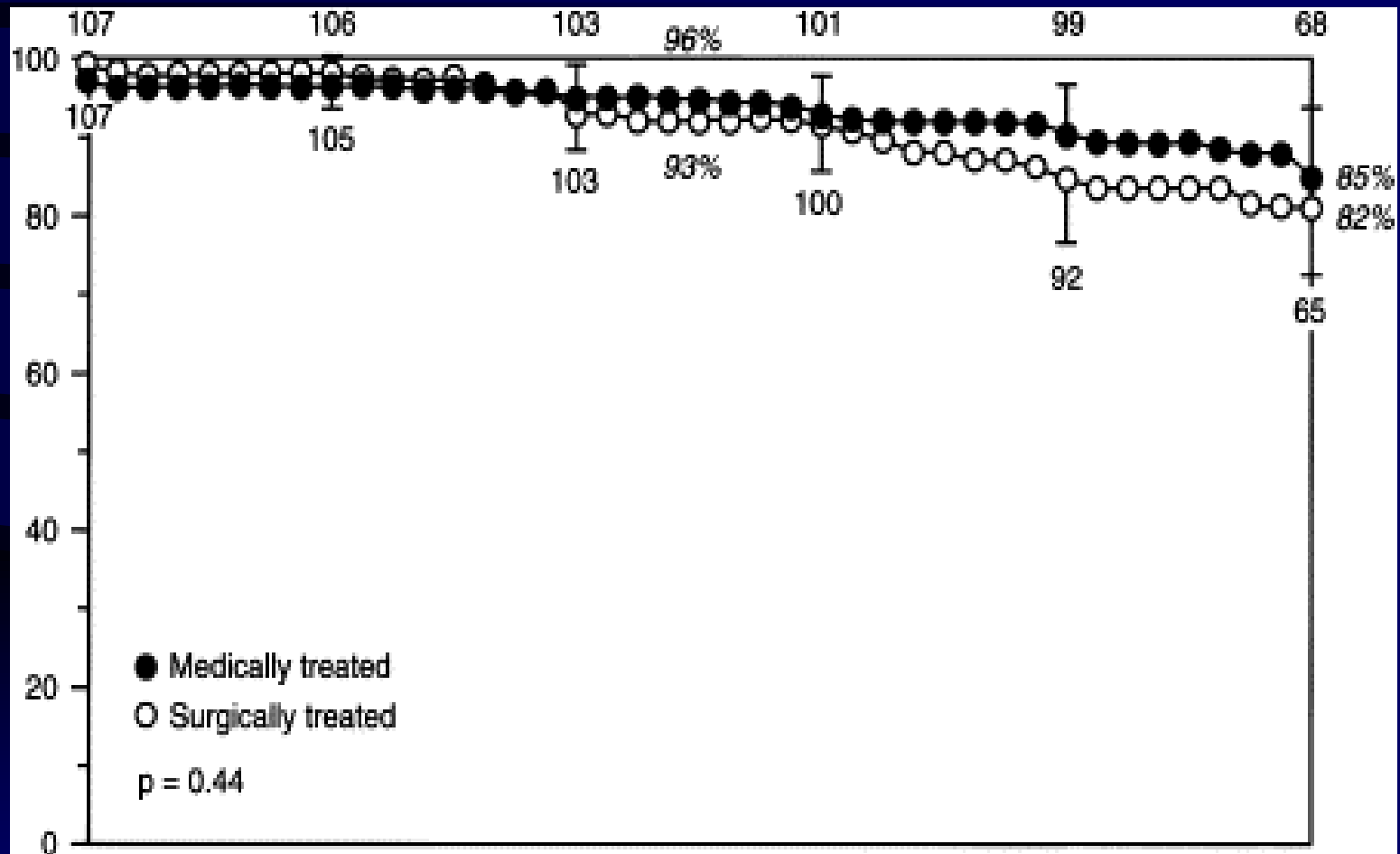
Risk Stratification

- There are no randomized trials to compare treatment strategies based **only** on noninvasive data.
- But there are available trials which use **angiographic data** to stratify patients with stable angina:
 - ◆ **High risk (Left main, 3-vessel disease, proximal LAD, ↓ EF).**
 - ◆ **Moderate risk (Multivessel CAD, normal EF).**
 - ◆ **Low risk (Single vessel CAD, normal EF).**

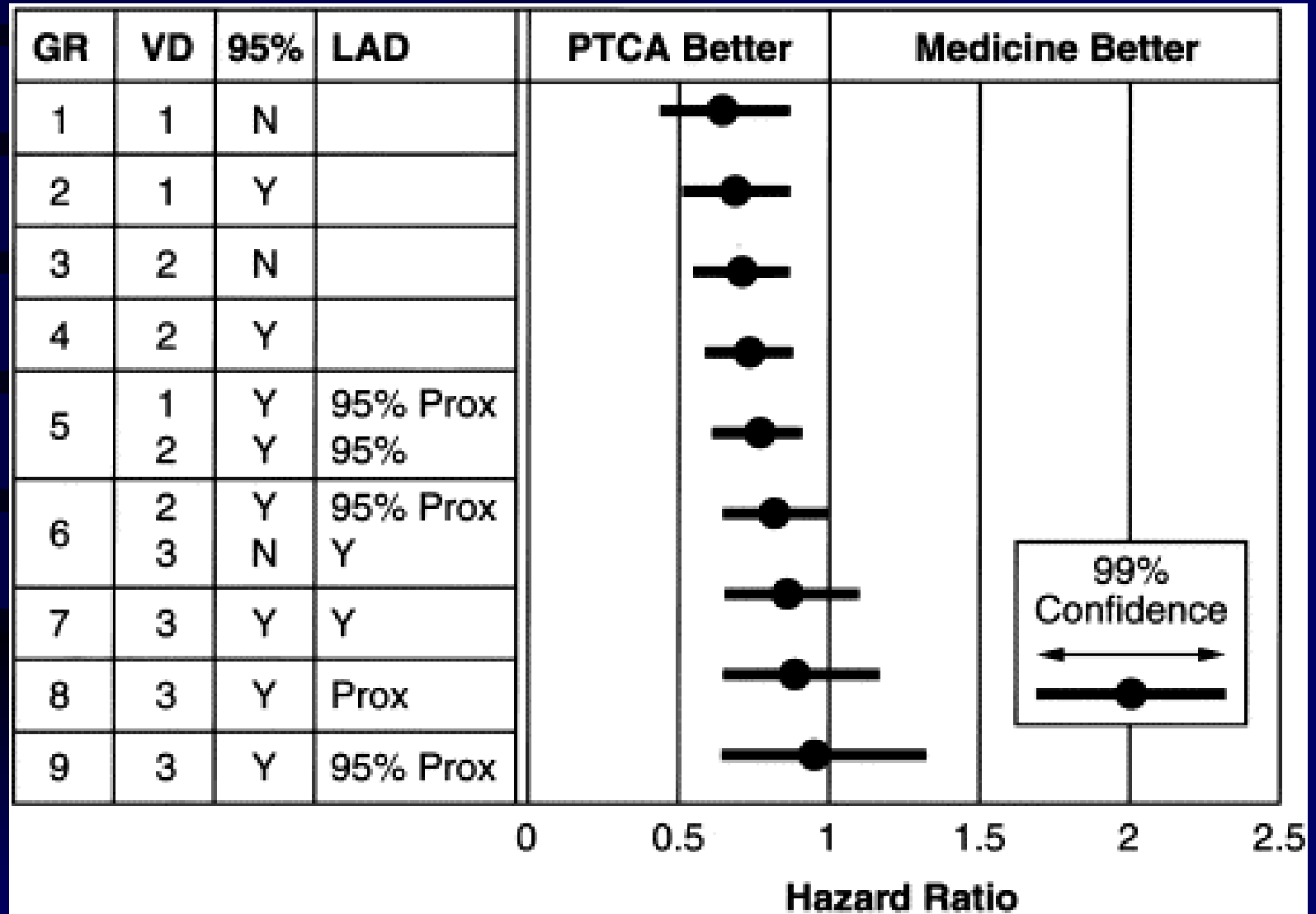
CABG vs Medical Therapy



CABG vs Medical Treatment: CASS Study: 10 year survival in single vessel disease

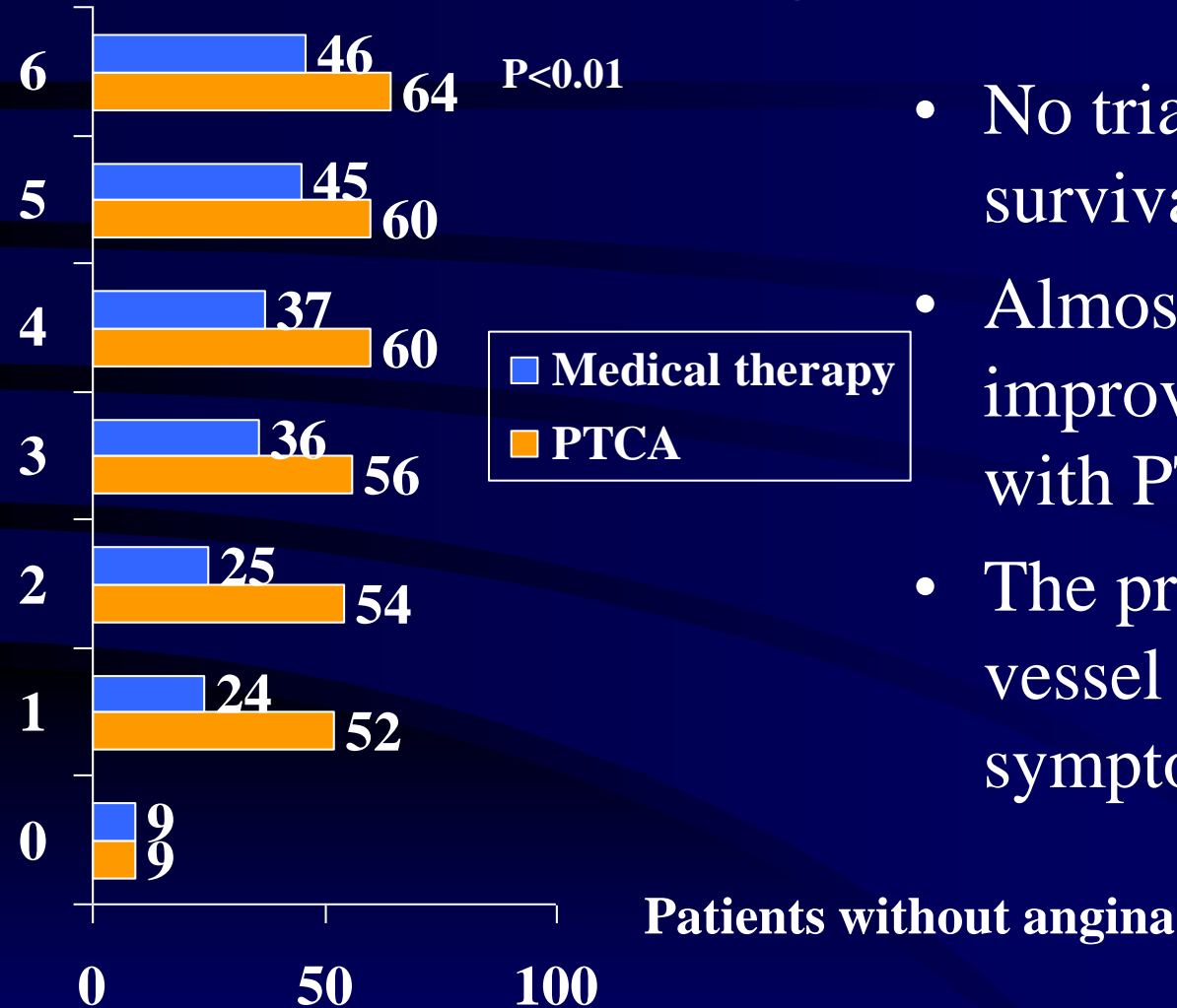


PTCA vs Medical Management



PTCA vs Medical treatment in stable single vessel CAD

Months



- No trial demonstrated a survival benefit of PTCA.
- Almost all trials showed improved quality of life with PTCA.
- The prognosis of single vessel disease and mild symptoms is excellent.

Also consider Coronary Angiography: Class IIa / Level of Evidence C

- CCS class III or IV which improves to I or II with medical therapy.
- Class I or II that fails to respond to therapy.
- Serial “identical” noninvasive testing showing progressively worsening abnormalities.
- A “need to know” situation in high risk professionals.

Acute Coronary Syndromes (ACS)

- Unstable Angina
- Non STE MI
- STE MI

High risk Predictors (Death or Nonfatal MI)

- >20 min Chest pain or angina at rest.
- Dynamic ST changes.
- Previous PCI or CABG.
- Worsening MR, S₃ gallop.
- Hemodynamic instability.
- Pulmonary edema related to ischemia or EF<40%.
- Elevated Serum cardiac markers:
 - * Troponin I & T
 - * CPK-MB.
 - * Myoglobin.
- High risk criteria on noninvasive testing.

Low risk patients

The goal is to determine whether revascularization is indicated.

- Class IIb recommendation:
Low short-term-risk unstable angina, without high criteria on noninvasive testing (Level of evidence C)
- Intensive medical therapy and noninvasive evaluation including echocardiography for risk stratification **is the way to go...**

Intermediate or High risk patients

The goal is whether revascularization is emergent, urgent or ... at least beneficial!!!

- Intensive Medical management.
 - * Aspirin.
 - * Standard or low molecular weight heparin.
 - * Glycoprotein IIb/IIIa inhibitors.
- Patients who do not respond after (one hour) of aggressive therapy or have recurrence after initial stabilization emergent or urgent **angiography should be performed - Class I recommendation.**

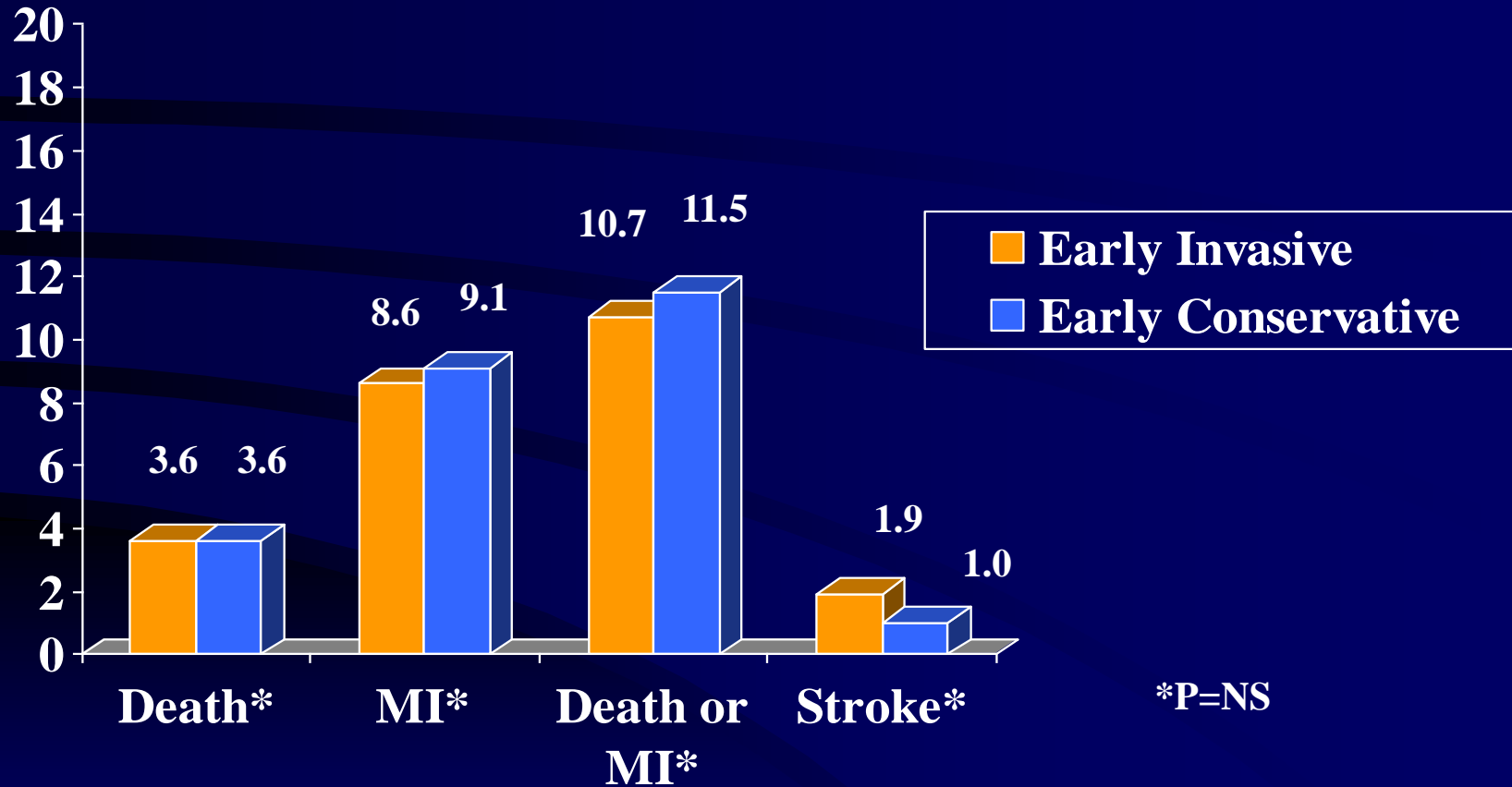
What happens if a high risk patient stabilizes after initial treatment ?

- AHCPR proposes an “early invasive” or “early conservative” strategy...
- ACC recommends coronary angiography in high or intermediate risk patients that stabilize after initial treatment - **Class I (Level of evidence A)**.
- ACC also recommends angiography in “initially low short-term-risk unstable angina that is subsequently high on non invasive testing” - **Class I (Level of evidence B)**.

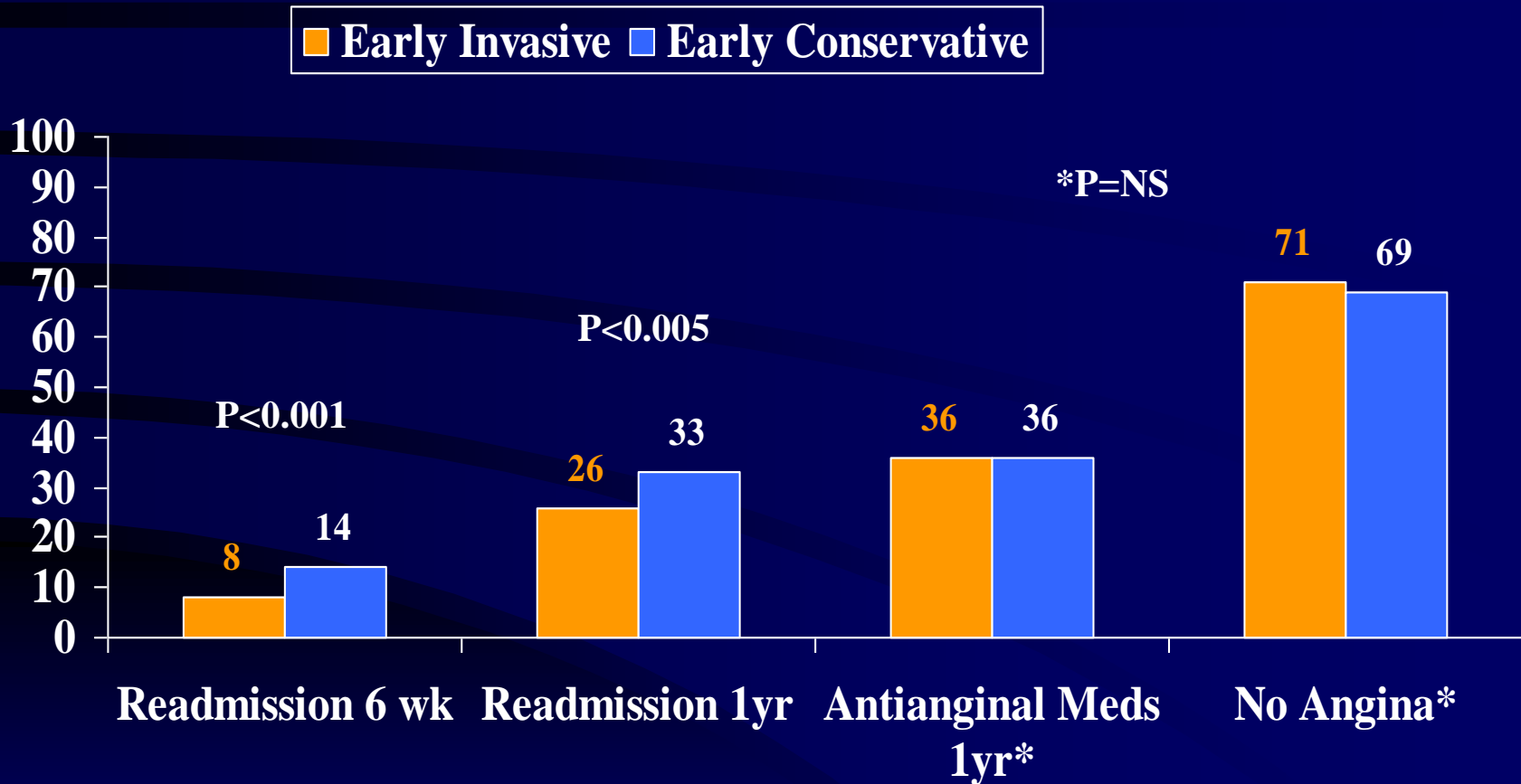
ACS: Timing of Intervention

- **TIMI IIIB** → ACS: No difference.
- **VANQWISH** → NQWMI: Invasive worse.
- **MATE** → ACS: Medicine vs Angioplasty-
No difference in long term.
- **DANAMI** → Post MI: Invasive better (CEP).
- **OASIS REGISTRY** → ACS: No difference.
- **FRISC-II** → ACS: Invasive 22% better.
- **MITI REGISTRY** → NQWMI: Invasive better.

One Year Results in TIMI IIIB (Unstable Angina)



TIMI IIIB: Repeat Hospital Admission, Anginal Status, Antianginal Medications

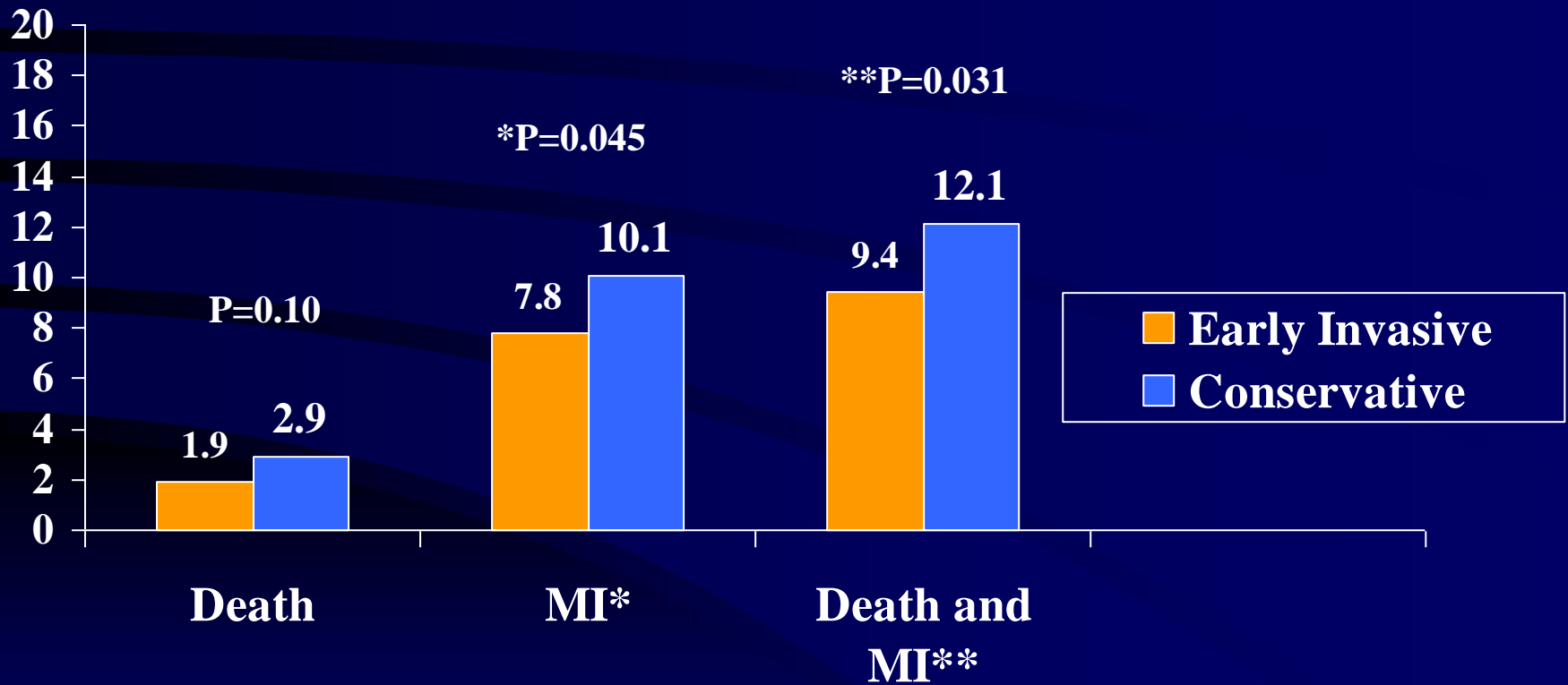


FRISC - II Study

- Intermediate and High risk patients.
- Dalteparin vs Placebo.
- “Early” Invasive vs Conservative.
- Dalteparin instead of standard Heparin.
- Even the Invasive Group received ≈ 4 days of Dalteparin.
- Stents at 61/70% in PCI.
- Abciximab in 10/10% in PCI.

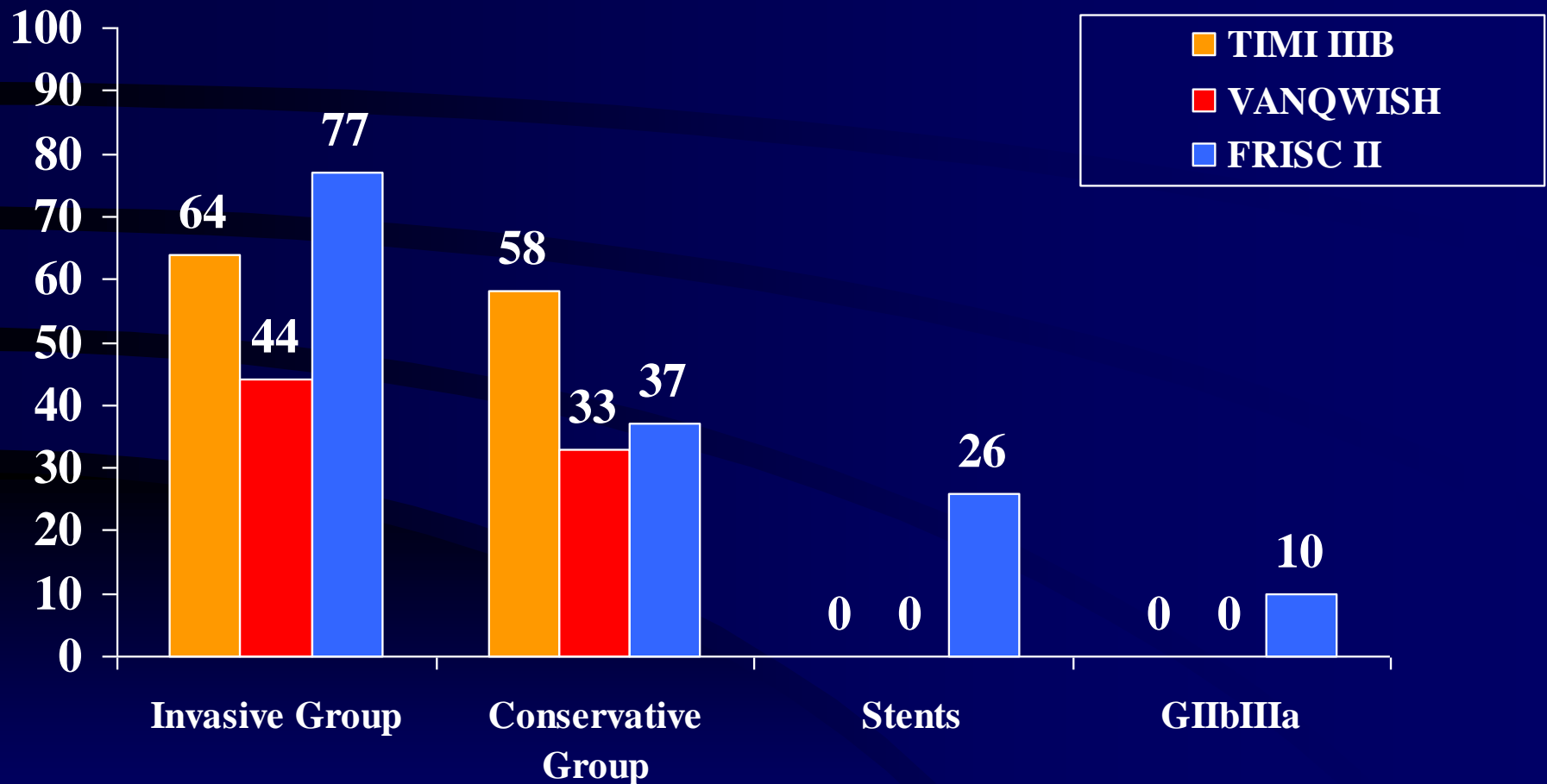
FRISC - II Trial in ACS

(6 months data)



TIMI III B - VANQWISH - FRISC II

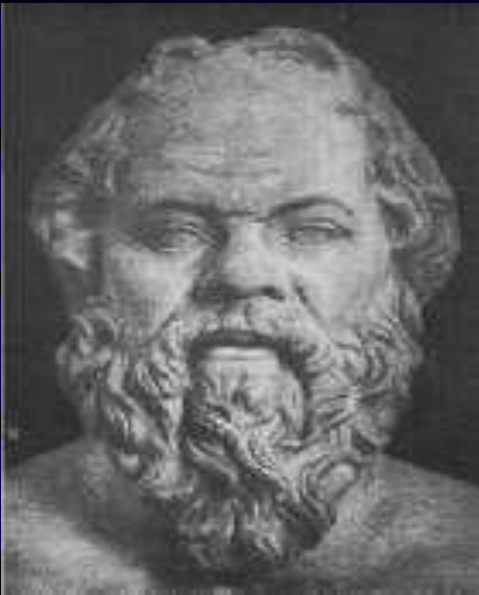
Differences in Revascularization rates



Summary: After the trials...

- Pathophysiology of unstable angina is clear.
- Management of ACS is still controversial.
- High risk patients seem to benefit from “early” invasive approach.
- Use of LMWH, GIIbIIIa inhibitors, Statins.
- Use of stents in combination with potent antiplatelet therapy.

The struggle for evidence...



Socrates (469-399 BC)



Aristotle (384-322 BC)

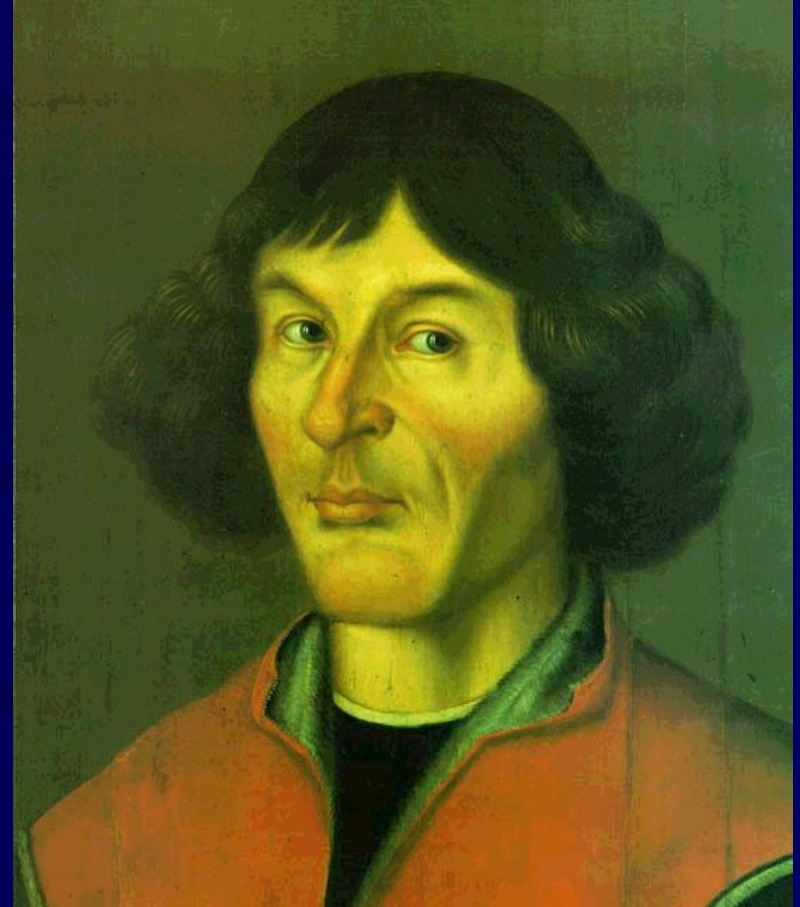


Plato (428-347 BC)

The persistence in evidence...



G. Galilei (1564-1642 AC)



N. Copernicus (1473-1543 AC)

The journey to evidence...



“When you sail for Ithaca
wish that your trip be long,
full of adventures,
full of knowledge...”

K. P. Kavafis (1863-1933)

Odysseus and Penelope.