

**ADVANCES IN CARDIAC ARRHYTHMIAS AND GREAT
INNOVATIONS IN CARDIOLOGY –
XXIV GIORNATE CARDIOLOGICHE TORINESI**

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Recurrent Angina after Coronary Revascularization

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Conflict of interest: none

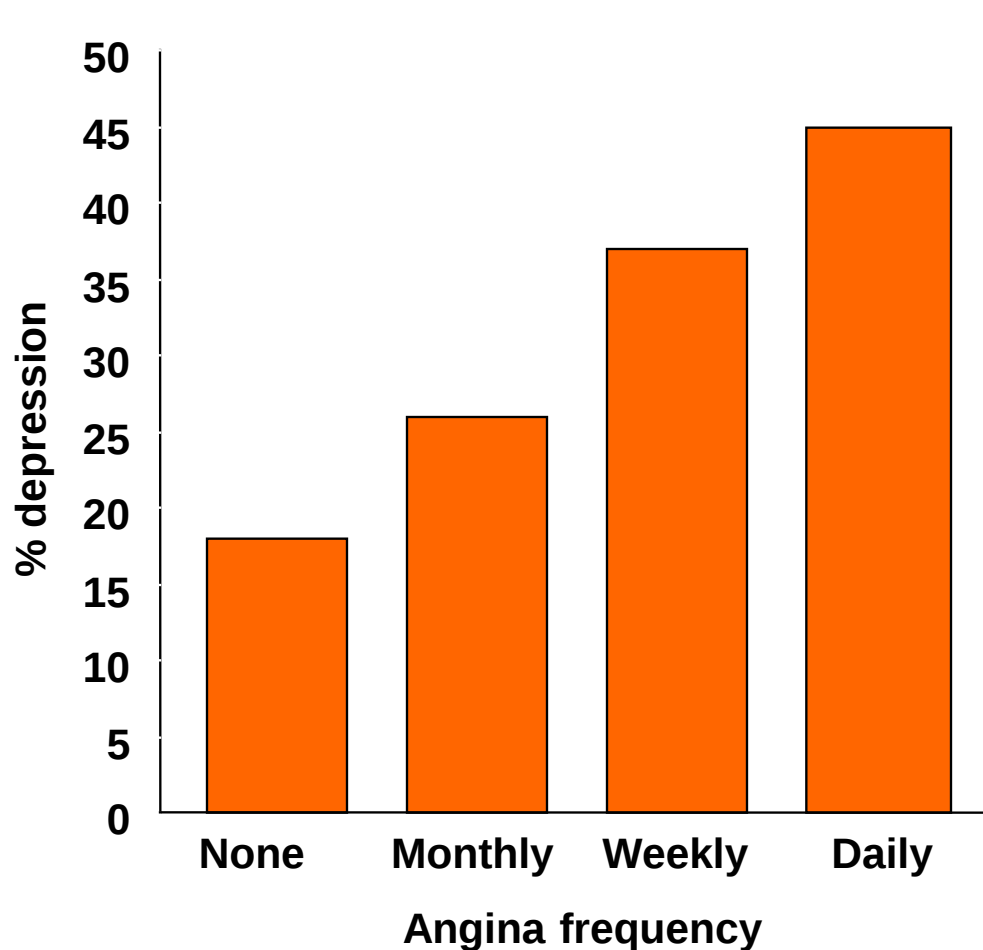


Stable Angina:

Magnitude of the Problem

- **The Euro Heart Survey reports that, at diagnosis, 60% of pts with angina are moderately/severely limited in their daily activities** (Daly CA et al. Eur Heart J. 2005;26:996–1010)
- **A significant number of pts with angina pectoris cannot be efficiently controlled; these pts have disabilities and their quality of life deteriorates** (Pocock SJ et al JACC 2003;42:1161–70; Boden WE et al. NEJM 2007;356:1503–16)
- **Angina pectoris frequently causes permanent disability and pts' quality of life deteriorates markedly at a younger age than in pts with heart failure** (Fox K et al Eur Heart J. 2006;27:1341–81)
- **The WHO considers IHD to be the second cause of disability-adjusted life years lost after depression**

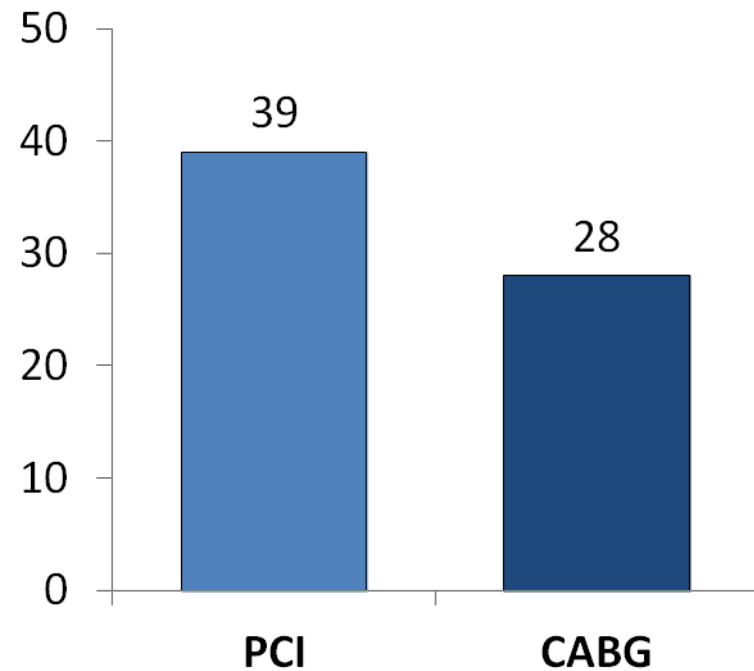
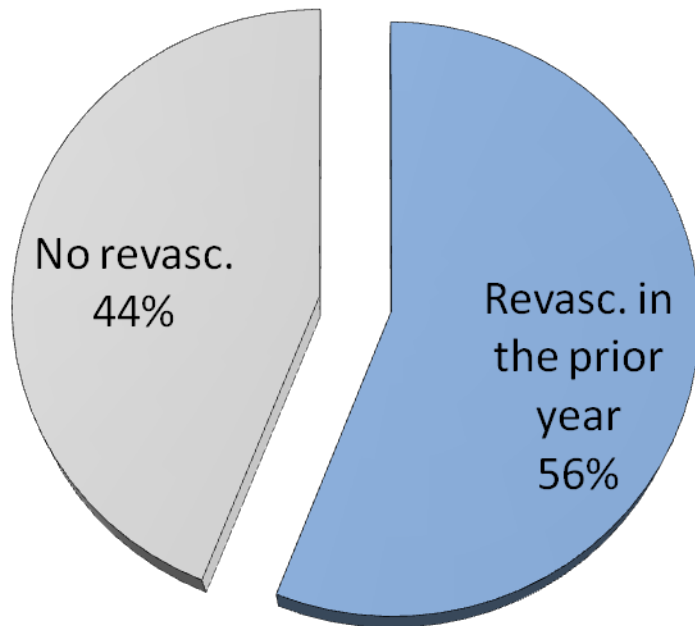
Angina Frequency and Depression



- 1957 patients completed SAQ 7 mo after ACS
- History of depression documented in 526 (26.7%) patients following ACS
- Strong correlation of angina frequency with depression

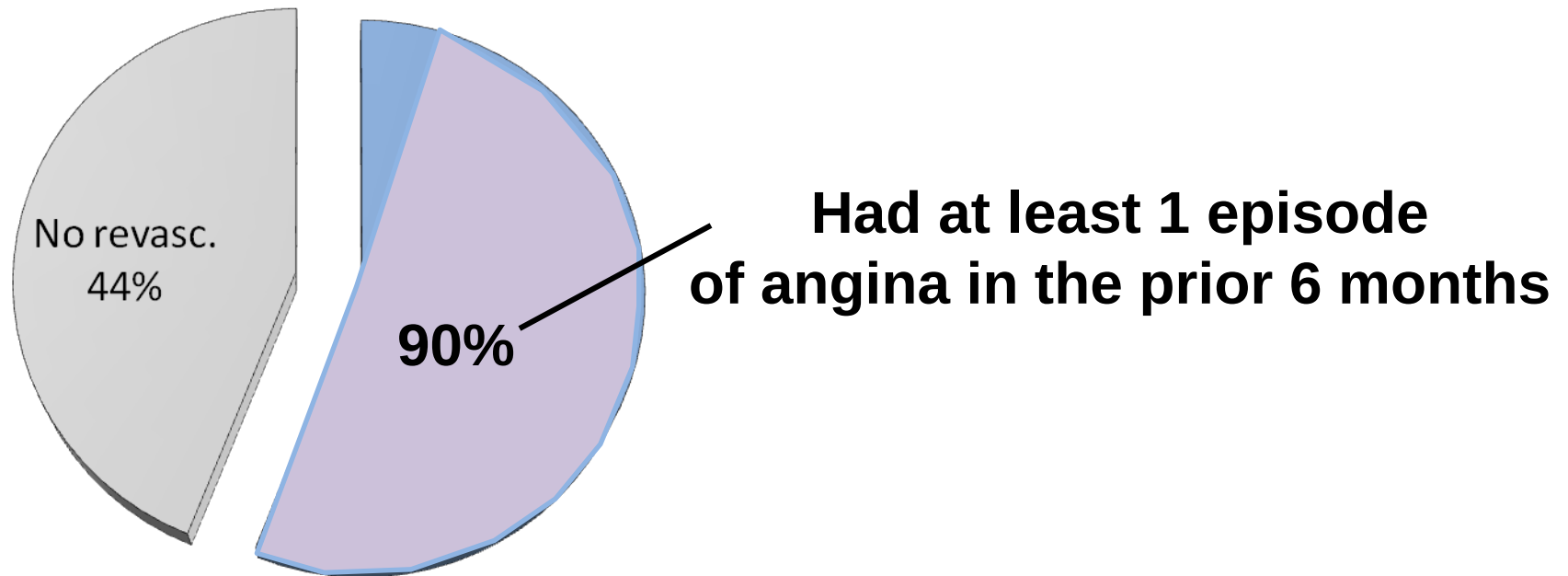
Recurrent Angina after Coronary Revascularization: a Clinical Challenge

**~2000 patients diagnosed with chronic angina
West Hospital, Richmond, VA, USA**



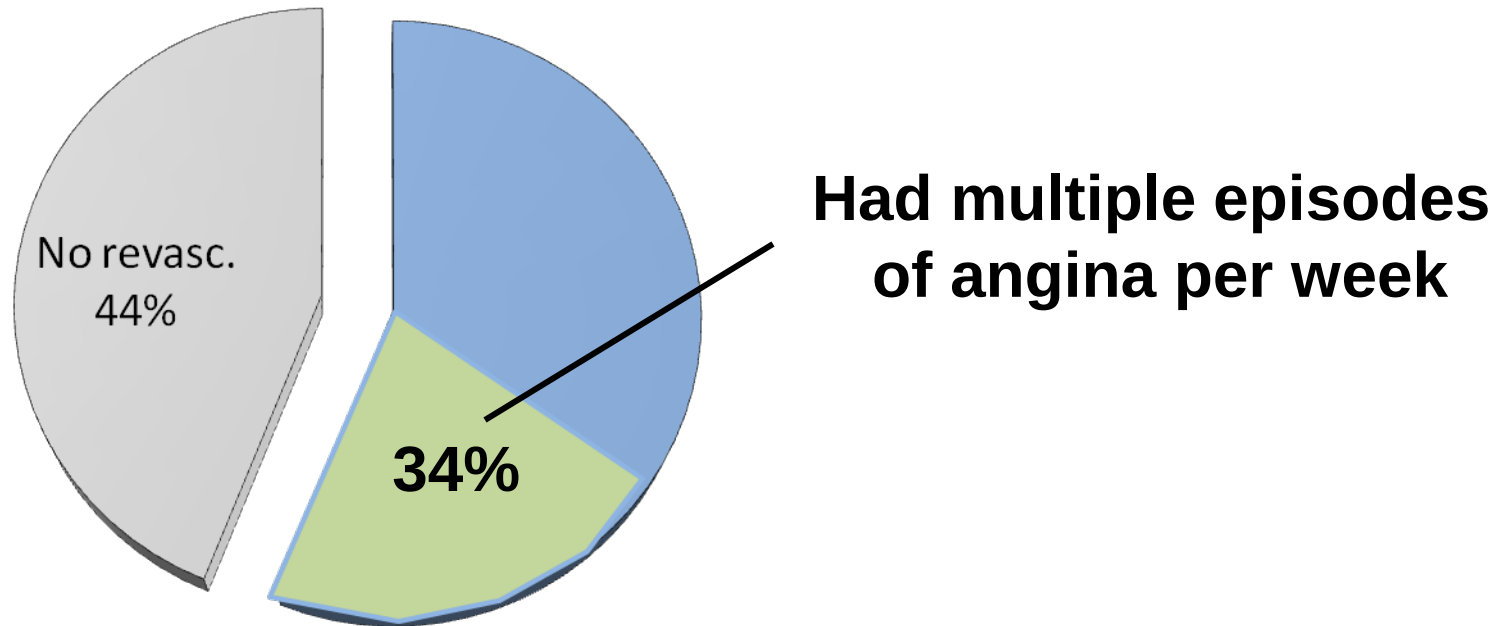
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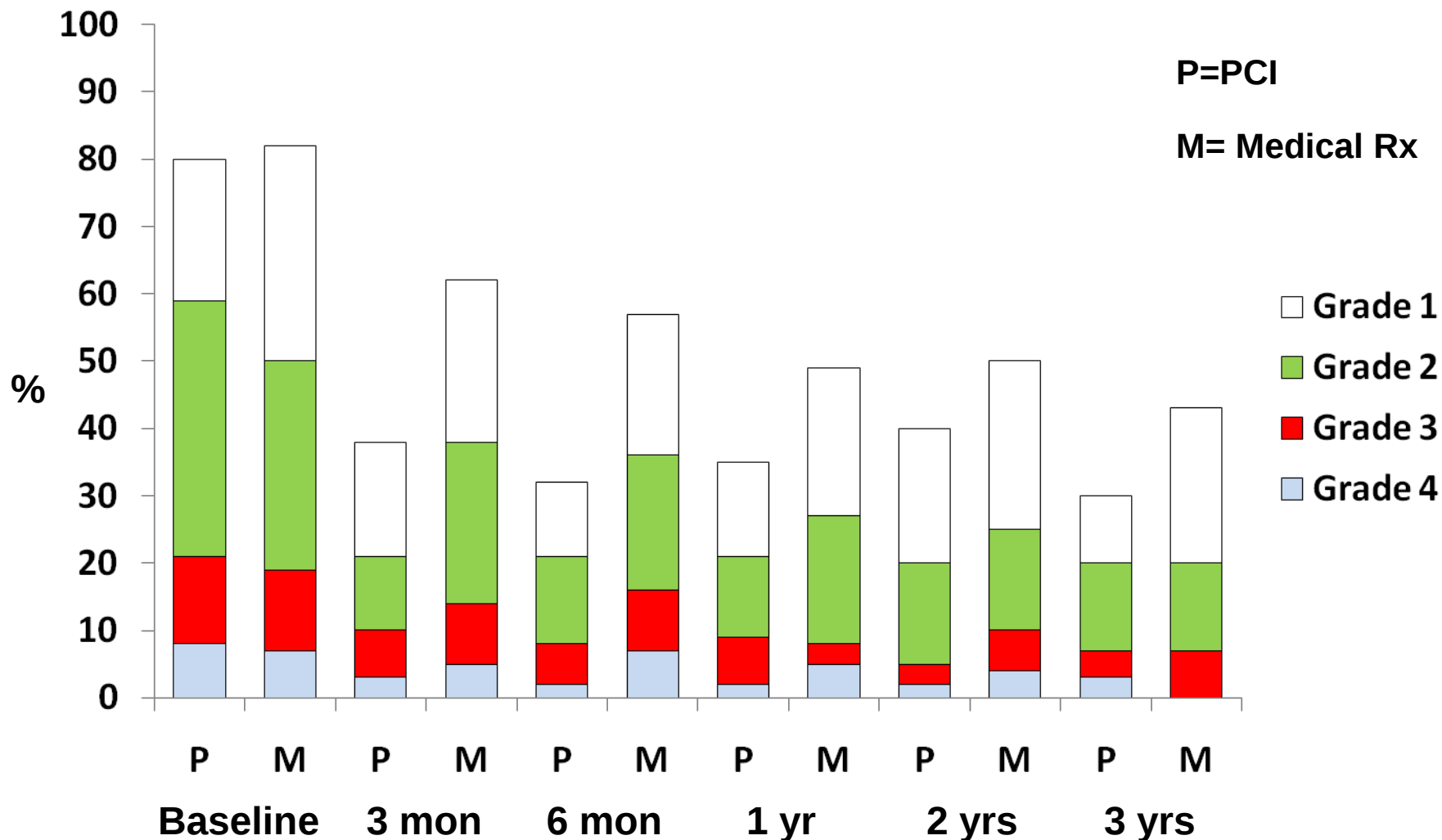


Recurrent Angina after Coronary Revascularization: a Clinical Challenge

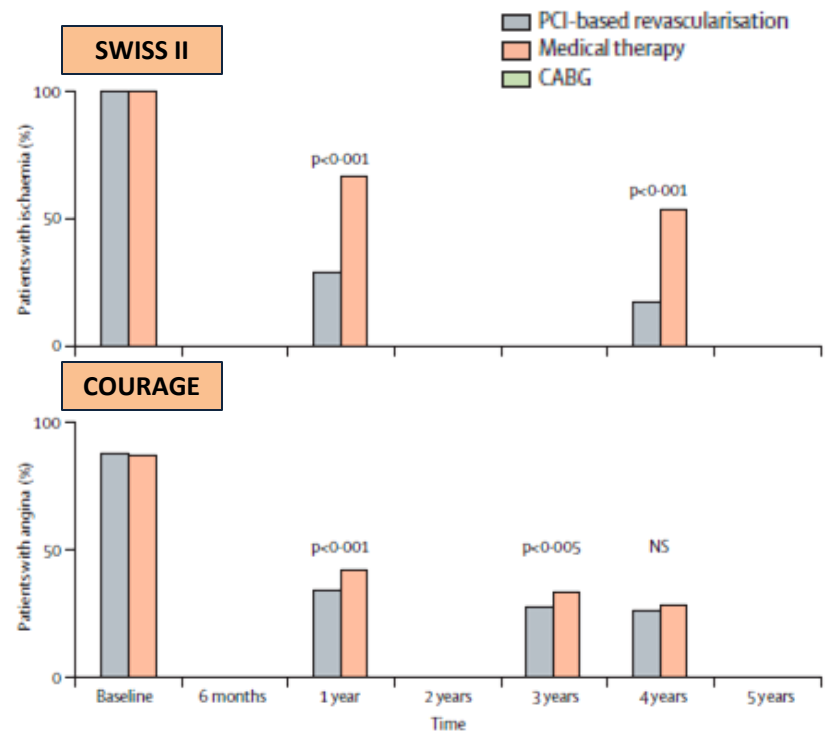
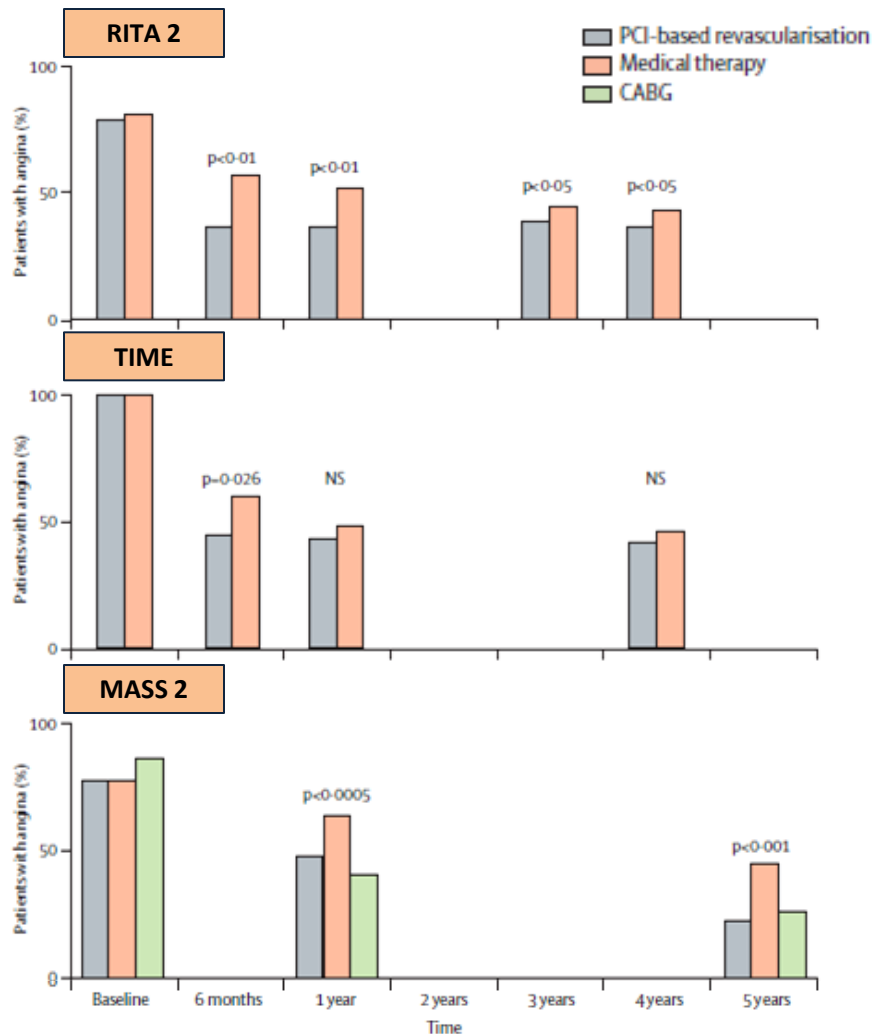
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Efficacy and Limitations of PCIs for the Treatment of Angina

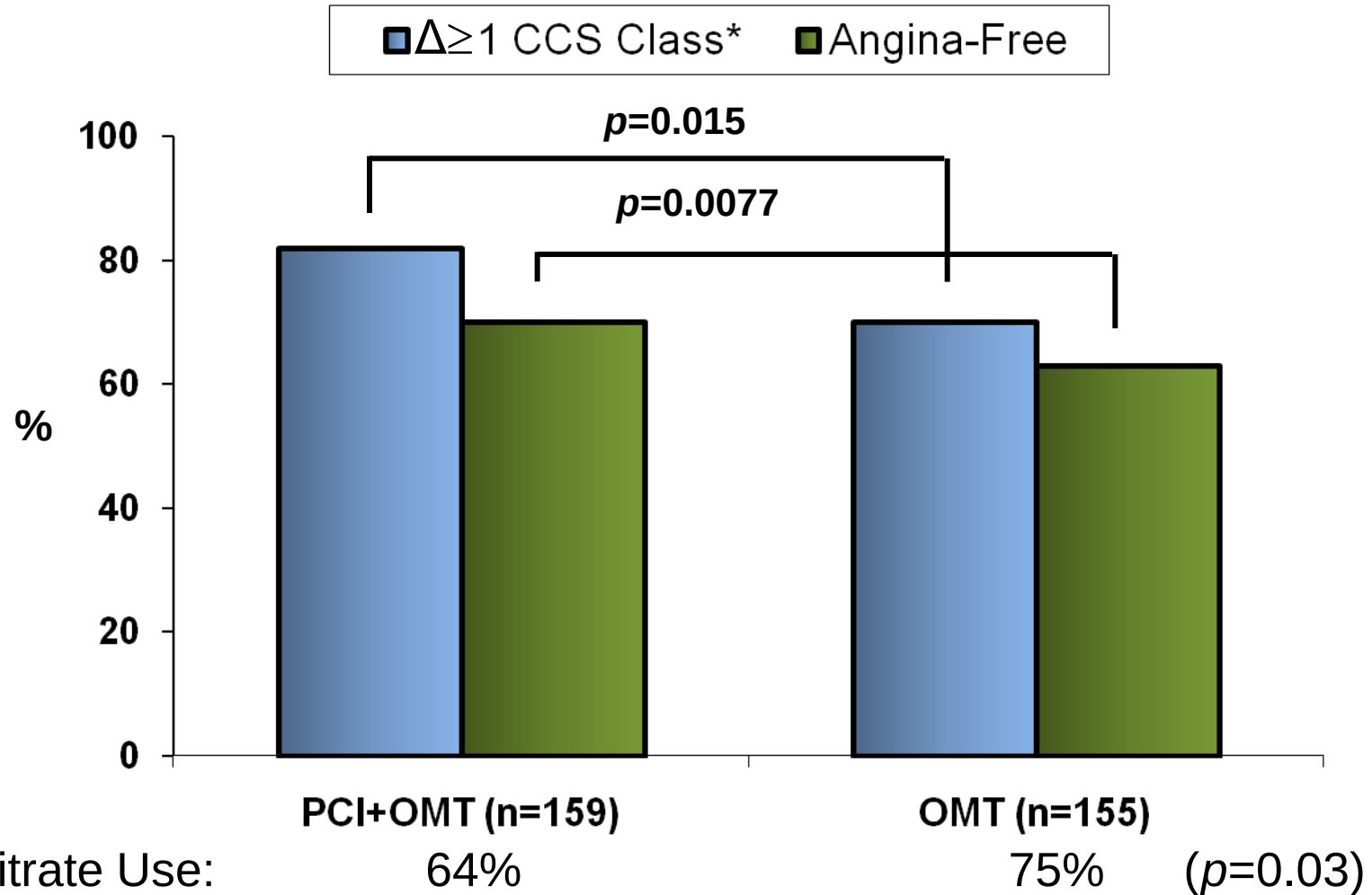


Effect of Treatment Strategies on Patients with Angina or Ischaemia in the Different Trials





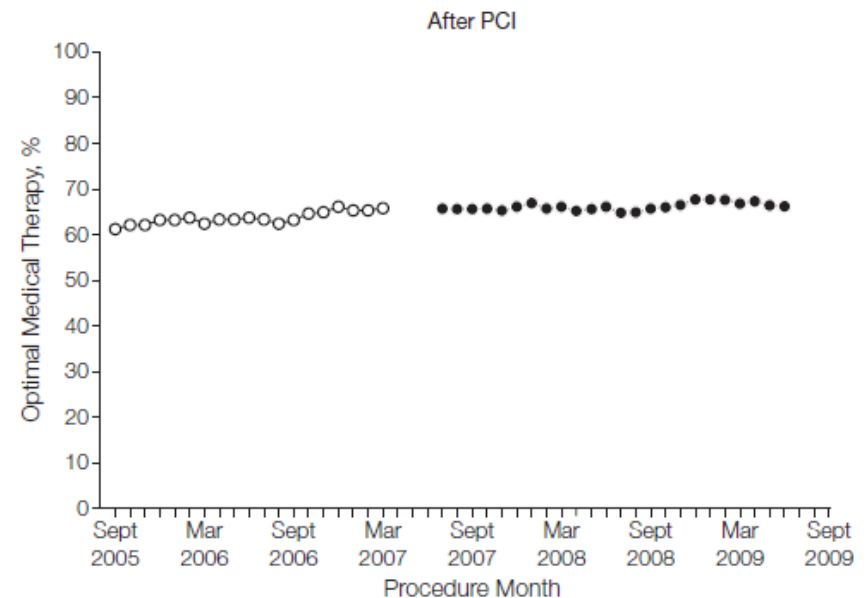
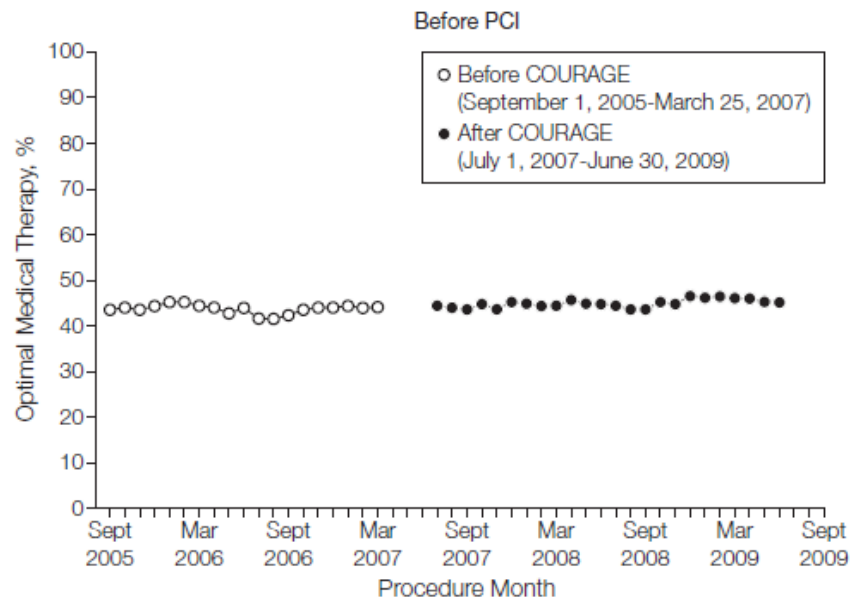
Angina Class Improvement & Angina-Free Status at 6-18 mos.



*CCS=Canadian Cardiovascular Society

Patterns and Intensity of Medical Therapy in Patients Undergoing PCI

Observational study of patients with stable CAD undergoing PCI in the National Cardiovascular Data Registry Between Sept 1, 2005, and June 30, 2009 (n= 467,211)



Symptoms Persist Despite Progress of Treatment

Progress of Stable Angina Treatment Over Time

	PREVESE I	EUROASPIRE I	Programa 3C	PREVESE II	EUROASPIRE II	EUROASPIRE III	TRECE	AVANCE
Year	1994	1995	1998	1998	1999	2006	2006	2010
Patients, no.	1329	4863	3074	2054	5556	8966	2897	2024
BB, %	33.3	34.7	37.4	45.1	47	80	64.5	77.6
ACE inhibitors or ARB, %	32.5	29.5	27	50.4	22	71	51.5	73.5
Antiplatelet drugs, %	89.7	81.2	84.1	87.8	86	91	84	96.3
Statins, %	6.7	32	27.5	29.4	60	78	75	93.1

ACE, angiotensin converting enzyme; ARB, angiotensin receptor blockers; BB, beta blockers.

Despite the increased use of drug treatments, and high revascularization rate, nearly half the pts in the registry were symptomatic and 10.5% had >3 angina attacks per week.
At 8 months after PCI, 60% of the pts had symptoms of angina again

Most Common Causes of Recurrent Chest Pain after Revascularization

Coronary Causes

Post-PCIs

- Acute, subacute, late and very late stent thrombosis
- Incomplete revascularization
- Restenosis
- Progression of disease not involving the target lesion
- Stent 'stretch' pain

Post-CABG

- Early recurrence (1 month)
 - Technical surgical errors
 - Poor target vessel runoff
- Subacute recurrence (1-12 months)
 - Graft insertion site lesion
 - Incomplete revascularizaion
- Late recurrence (>12 months)
 - Degenerative graft disease
 - Progression of disease not involving the target lesion

Non-Coronary CV Causes

Myocardial

- LV hypertrophy (including hypertrophic cardiomyopathy)
- Microvascular dysfunction/inappropriate vasoconstriction

Valvular

- Aortic valve disease

Pericardial

- Pericarditis

Aorta

- Aortic dissection/intramural haematoma

Non-CV Causes

Gastrointestinal

- Gastroesophageal reflux disease/oesophagitis/oesophageal spasm
- Biliary colic/cholecystitis/cholangitis
- Pancreatitis

Pulmonary

- Asthma/COPD
- Pneumonia
- Pleuritis/Pneumothorax

Musculoskeletal

- Sternal surgical pain (post-CABG)
- Rib fracture
- Costochondritis
- Herpes Zoster; Fibromyalgia
- Anxiety/panic attack

Most Common Causes of Recurrent Chest Pain after Revascularization

Coronary Causes	Non-Coronary CV Causes
Post-PCIs Acute, subacute, late Incomplete revascularization Restenosis Progression of disease Stent 'stretch' pain Post-CABG Early recurrence (1 mo) Technical surgical error Poor target vessel runoff Subacute recurrence (1-6 mo) Graft insertion site leak Incomplete revascularization Late recurrence (>12 mo) Degenerative graft disease Progression of disease	Non-CV Causes Gastrointestinal Gastroesophageal reflux disease/oesophagitis/oesophageal spasm Biliary colic/cholecystitis/choolangitis Pancreatitis Pulmonary Asthma/COPD Pneumonia Pleuritis/Pneumothorax Musculoskeletal Sternal surgical pain (post-CABG) Rib fracture Costochondritis Herpes Zoster; Fibromyalgia Anxiety/panic attack

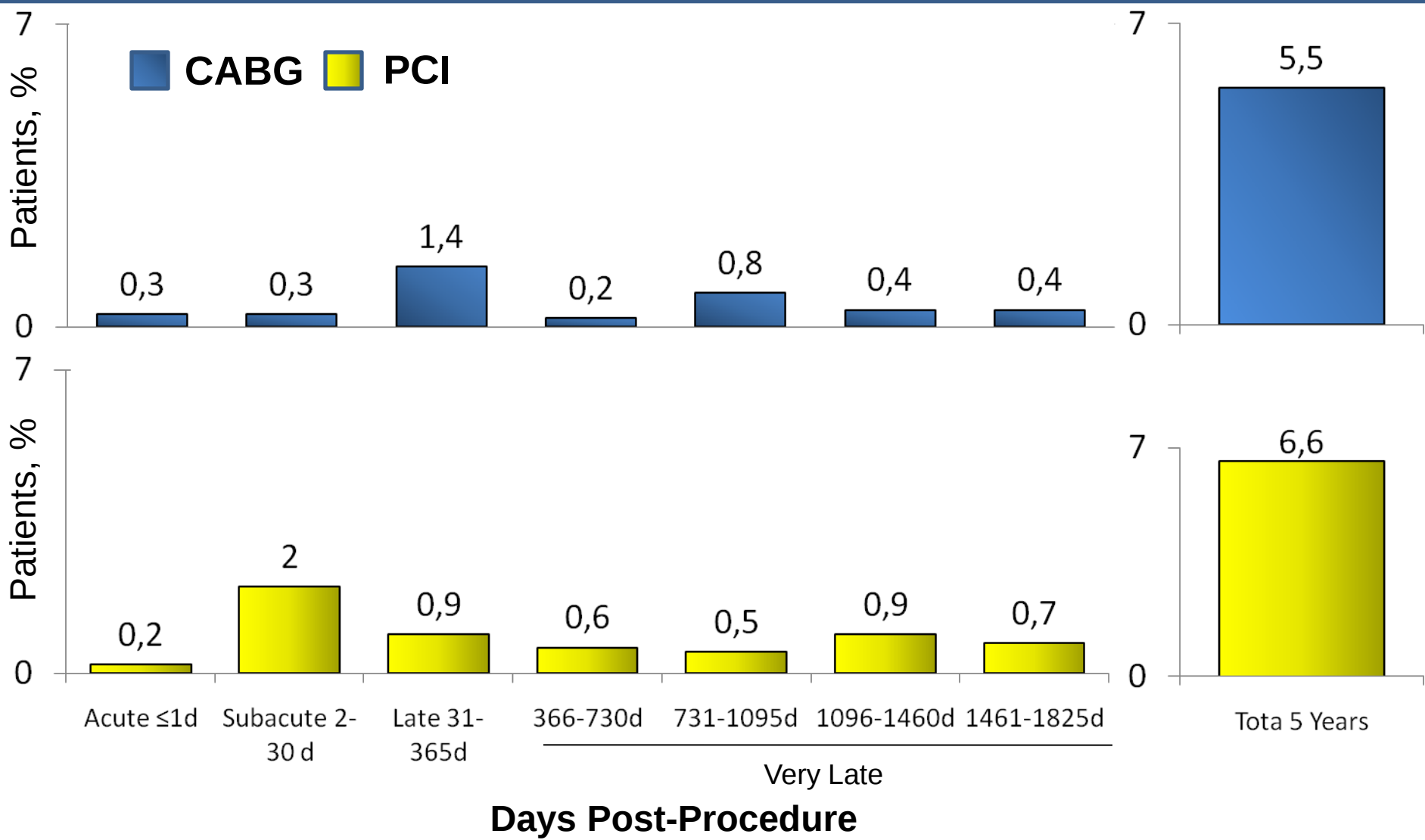
Most Common Causes of Recurrent Chest Pain after Revascularization

Coronary Causes	Non-Coronary CV Causes	
Post-PCIs Acute, subacute, late and very late Incomplete revascularization Restenosis Progression of disease not treated Stent 'stretch' pain	Myocardial LV hypertrophy (including hypertrophic cardiomyopathy) Microvascular dysfunction/inappropriate vasoconstriction	
Post-CABG Early recurrence (1 month) Technical surgical error Poor target vessel runoff Subacute recurrence (1-6 months) Graft insertion site lesion Incomplete revascularization Late recurrence (>12 months) Degenerative graft disease Progression of disease	Valvular Aortic valve disease	
	Pericardial Pericarditis	
	Aorta Aortic dissection/intramural haematoma	
	Pneumonia/Pneumothorax	
	Musculoskeletal Sternal surgical pain (post-CABG) Rib fracture Costochondritis Herpes Zoster; Fibromyalgia Anxiety/panic attack	

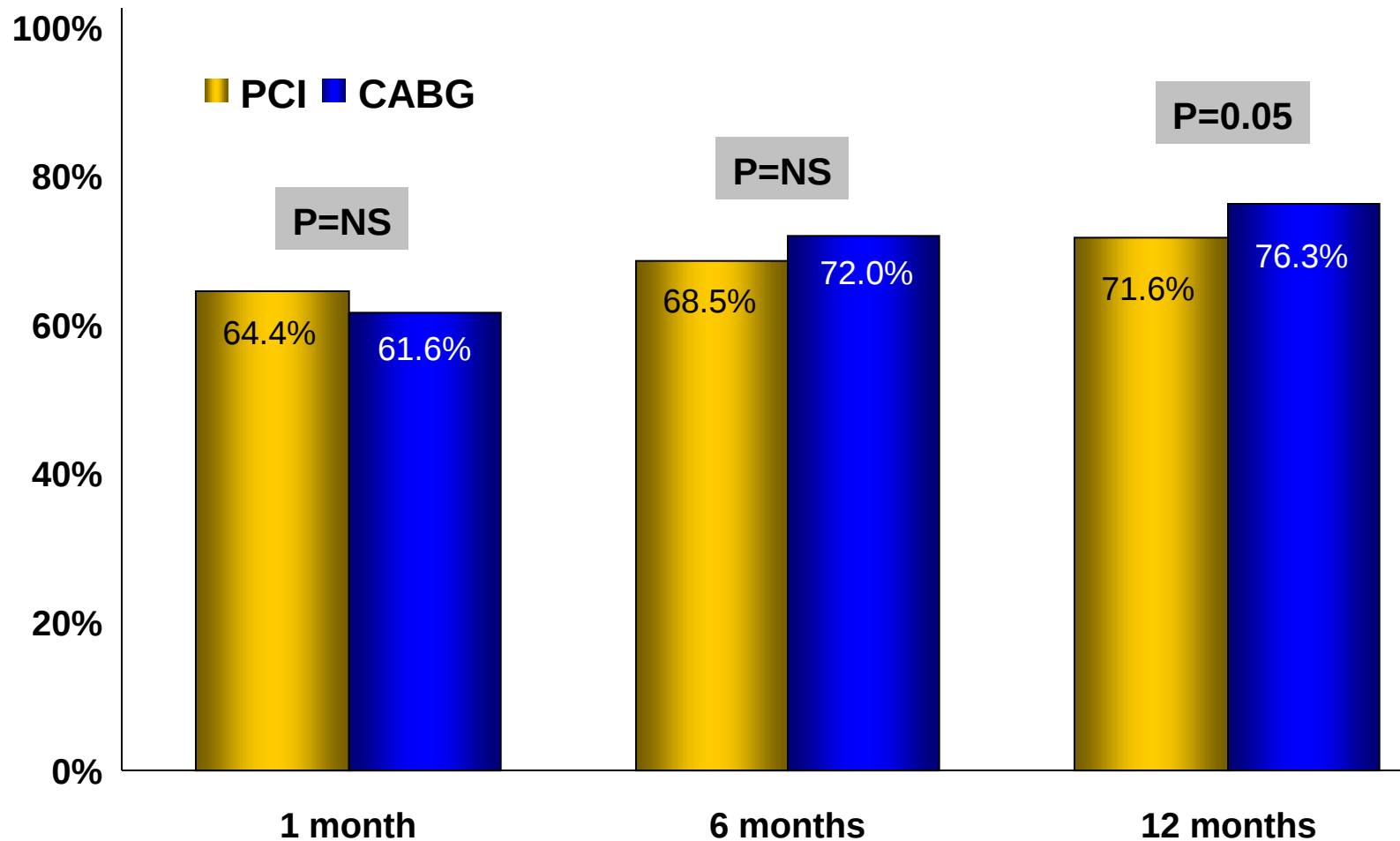
Most Common Causes of Recurrent Chest Pain after Revascularization

Coronary Causes	
Post-PCIs	
Acute, subacute, late and very late stent thrombosis	hypertrophic cardiomyopathy) /inappropriate vasoconstriction
Incomplete revascularization	
Restenosis	
Progression of disease not involving the target lesion	
Stent 'stretch' pain	al haematoma
Post-CABG	
Early recurrence (1 month)	
Technical surgical errors	sease/oesophagitis/oesophageal spasm holangitis
Poor target vessel runoff	
Subacute recurrence (1-12 months)	
Graft insertion site lesion	
Incomplete revascularizaion	
Late recurrence (>12 months)	CABG)
Degenerative graft disease	a
Progression of disease not involving the target lesion	

Per Protocol Graft Occlusion or Stent Trombosis to 5 Years



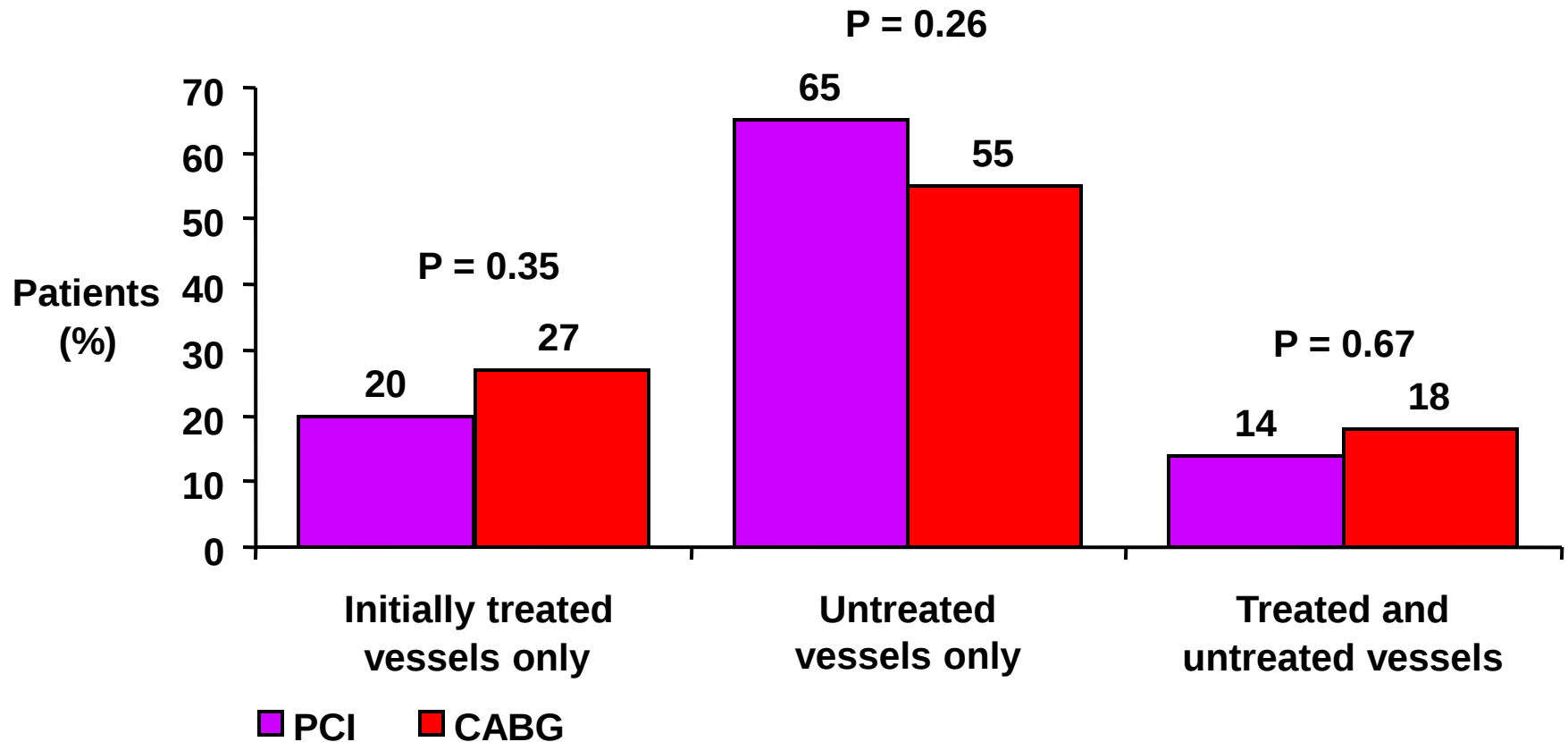
SAQ-AF: Angina-Free*



* Defined as SAQ-AF score = 100

CAD Progression: Major Cause of Post-Revascularization Angina

5-year follow-up of
BARI Trial

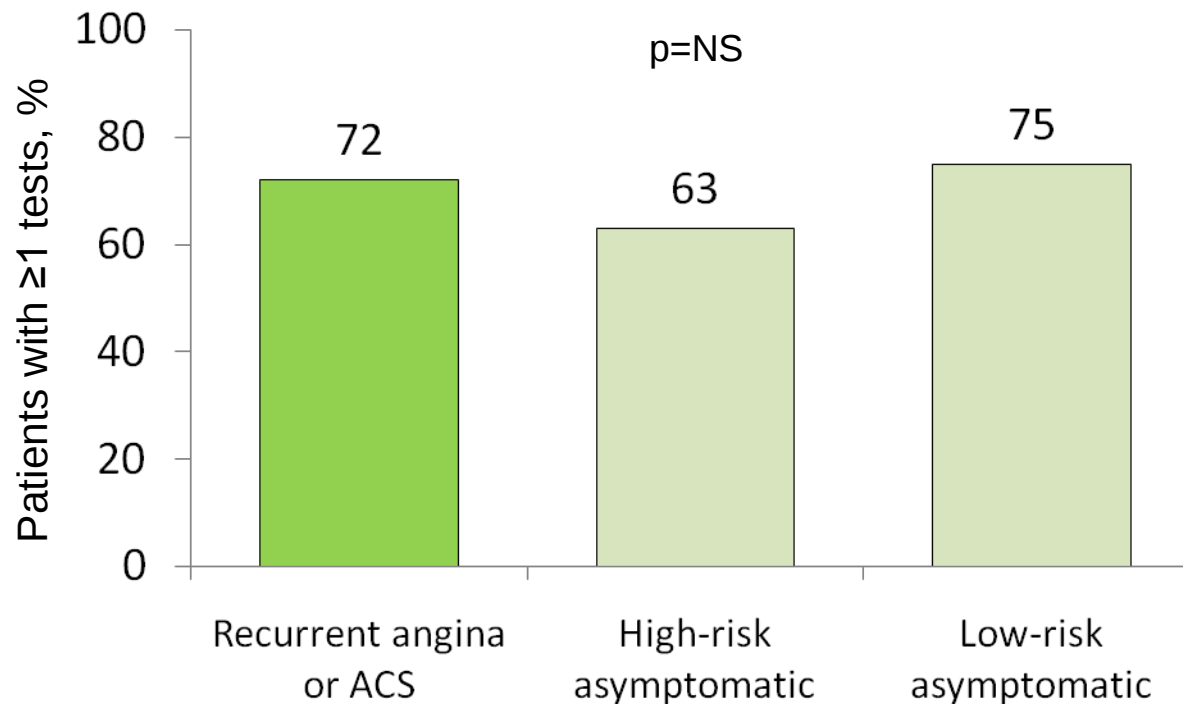
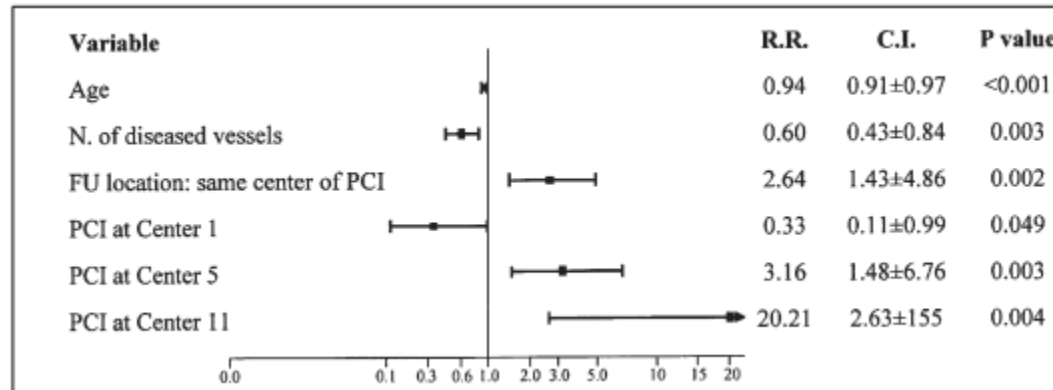


Changing Features of Angina after PTCA Suggest a Stenosis on a Different Artery Rather Than Restenosis

Patients with Different Pain Location after PCI
New stenoses 5/12 vs restenosis 0/26 (42% vs 0%, $P=.002$)

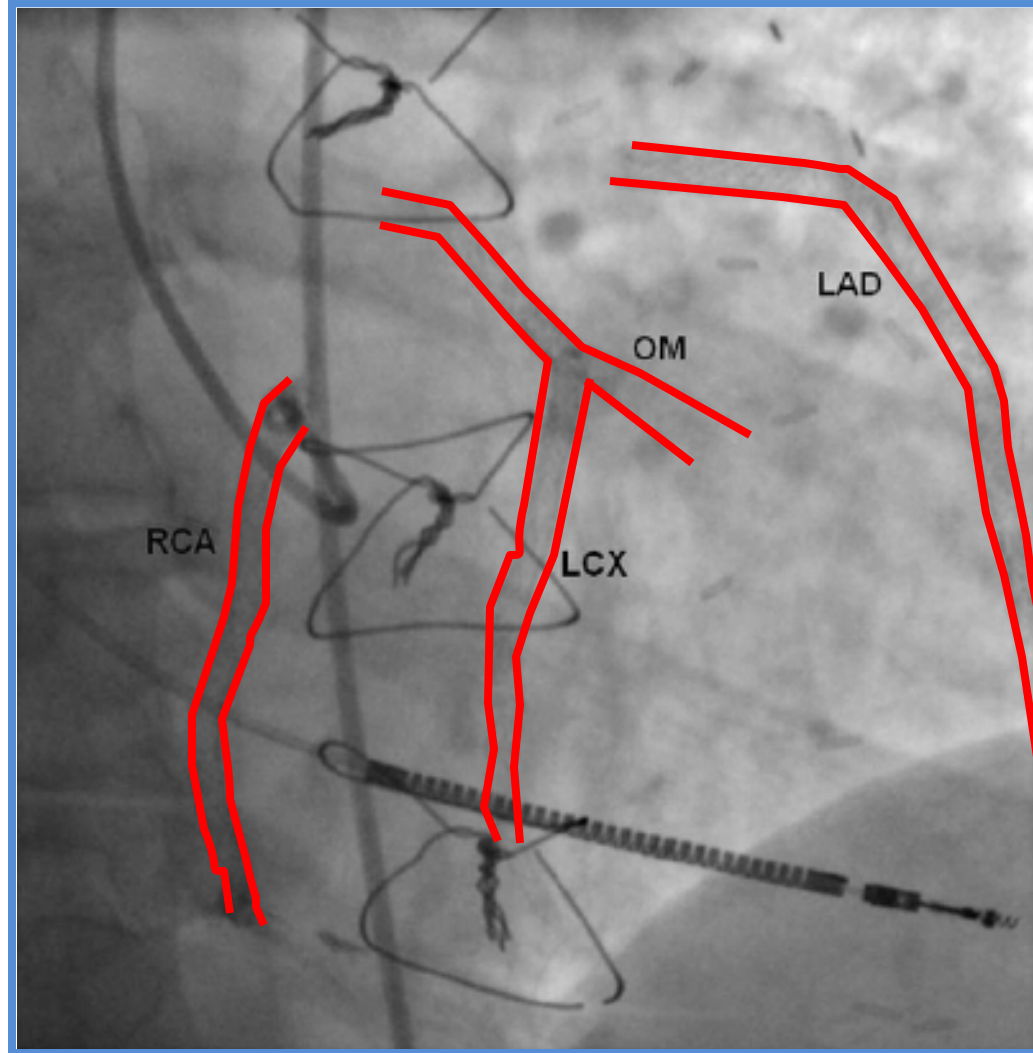
Pain Location Before PTCA	Pain Location After PTCA	Stenosis Before PTCA	Stenosis at Follow-up Angiography	Follow-up, mo
Left hemithorax	Supraclavicular region	80% LCx	99% first diagonal	12
Left arm	Retrosternal region	99% RCA	70% LAD	36
Epigastrium	Retrosternal region	90% LAD	80% LCx	33
Retrosternal region	Epigastrium	90% LAD	90% RCA	22
Retrosternal region	Left hemithorax	85% LAD	99% RCA	6

Use of Functional Tests and Planned Coronary Angio After PCI in Clinical Practice. The AFTER Study



How Much is Too Much?

56-year-old male
28 catheterizations
over 10 years;
67 stents placed in
his native coronary
arteries as well as
in 3 bypass grafts



STAR

Stable Coronary Artery
Diseases Registry





**Registro osservazionale, prospettico,
multicentrico, nazionale sulle modalità di
trattamento di pazienti consecutivi ricoverati
con diagnosi di coronaropatia stabile**





- Ottenere un completo e attendibile *data set* sulle modalità di diagnosi e trattamento (farmacologico e non-farmacologico) dei pazienti ricoverati con diagnosi di coronaropatia stabile;
- Migliorare la conoscenza sulla prevalenza dei ricoveri ospedalieri per coronaropatia stabile, sull'aderenza al trattamento farmacologico in questo gruppo di pazienti, sull'impatto clinico e sulla qualità della vita della coronaropatia stabile in un ampio gruppo di pazienti ricoverati in diverse aree geografiche italiane;
- Valutare le possibili motivazioni per le quali, alla luce delle attuali evidenze scientifiche, i pazienti ricoverati con diagnosi di coronaropatia stabile vengono sottoposti a rivascolarizzazione miocardica o indirizzati a trattamento farmacologico.



- Valutare l'utilizzo di risorse durante il ricovero dei pazienti affetti da coronaropatia stabile;
- Valutare l'attuale e reale utilizzo del trattamento farmacologico ottimale e della ricerca di ischemia miocardica prima dell'eventuale esecuzione di un'angioplastica elettiva in un'ampia e variegata popolazione di pazienti affetti da coronaropatia stabile;
- Valutare la ricorrenza di sintomi anginosi (angina o equivalenti anginosi) o di nuovi ricoveri per cause cardiovascolari dopo trattamento farmacologico per il controllo dei sintomi e/o dopo PCI/CABG per coronaropatia stabile ad un anno di follow-up.



Treating stable angina – is there a NICE way towards an international consensus?

Purcell H, Int J Clin Pract 2011

WHAT IS Optimal Medical Treatment ?

- l' uso di ***uno*** o, se occorre, ***due farmaci antianginosi***
- ***farmaci e misure non farmacologiche per la prevenzione secondaria***
- un ***terzo farmaco*** antianginoso *se i sintomi non sono controllati con 2 farmaci o è prevista la rivascolarizzazione o non è ritenuto avviabile alla procedura*



Criteri di Inclusione



- Saranno inclusi nel registro i pazienti consecutivi con ≥ 18 anni ricoverati presso le Cardiologie aderenti al progetto nell'arco temporale di 3 mesi con diagnosi alla dimissione di coronaropatia stabile*, associata o meno a documentata ischemia miocardica inducibile.
- Potranno anche essere arruolati pazienti con pregressa rivascolarizzazione miocardica o asintomatici per angina (ma con equivalenti anginosi) ma con documentazione di ischemia miocardica inducibile.

* Angina cronica stabile, angina microvascolare o sindrome X, ischemia silente



3 mths

Data Entry

12 mths

Hospital facilities
Clinical Characteristics
Medical HTX
Previous stress test
Baseline ECG/Echo
Seattle Angina Quest.
RAND-36 health survey
In-H management
Cath Lab
In-H events
Drug Tx at discharge

Seattle Angina Quest.
CardioTEST
RAND-36 health survey
Clinical FU*
Drug adherence

* Death, MI, recurrent H, revasc.

CARDIOTEST ANMCO

	Cardiotest ANMCO	Punteggio	
1.	Nel corso delle sue abituali attività, le è capitato di avere negli ultimi 3 mesi una sensazione di oppressione al torace, dolore al petto o affanno: ▪ quando si vestiva o faceva il bagno ▪ mentre camminava o faceva piccole attività domestiche ▪ solo se saliva le scale, o portava pesi, o camminava a passo veloce	NO ☐ 0 NO ☐ 0 NO ☐ 0	SI ☐ 3 SI ☐ 2 SI ☐ 1
2.	Nell'ultimo mese le sensazioni di oppressione al torace, dolore al petto o affanno: ▪ sono state più frequenti che in passato ▪ i disturbi si sono presentati più volte nelle ultime due settimane	NO ☐ 0 NO ☐ 0	SI ☐ 2 SI ☐ 3
3.	Ha dovuto assumere le medicine sotto la lingua (Carvasin, Trinitrina, Natispray) a causa di questi disturbi?	NO ☐ 0	SI ☐ 2
4.	Ha avuto necessità di assumere queste medicine nelle ultime due settimane?	NO ☐ 0	SI ☐ 3
	TOTALE PUNTEGGIO	-----	
	N.B. Un punteggio complessivo ≥3 indica che la sintomatologia non è controllata in modo ottimale e quindi necessita una rivalutazione cardiologica.		

Conclusions

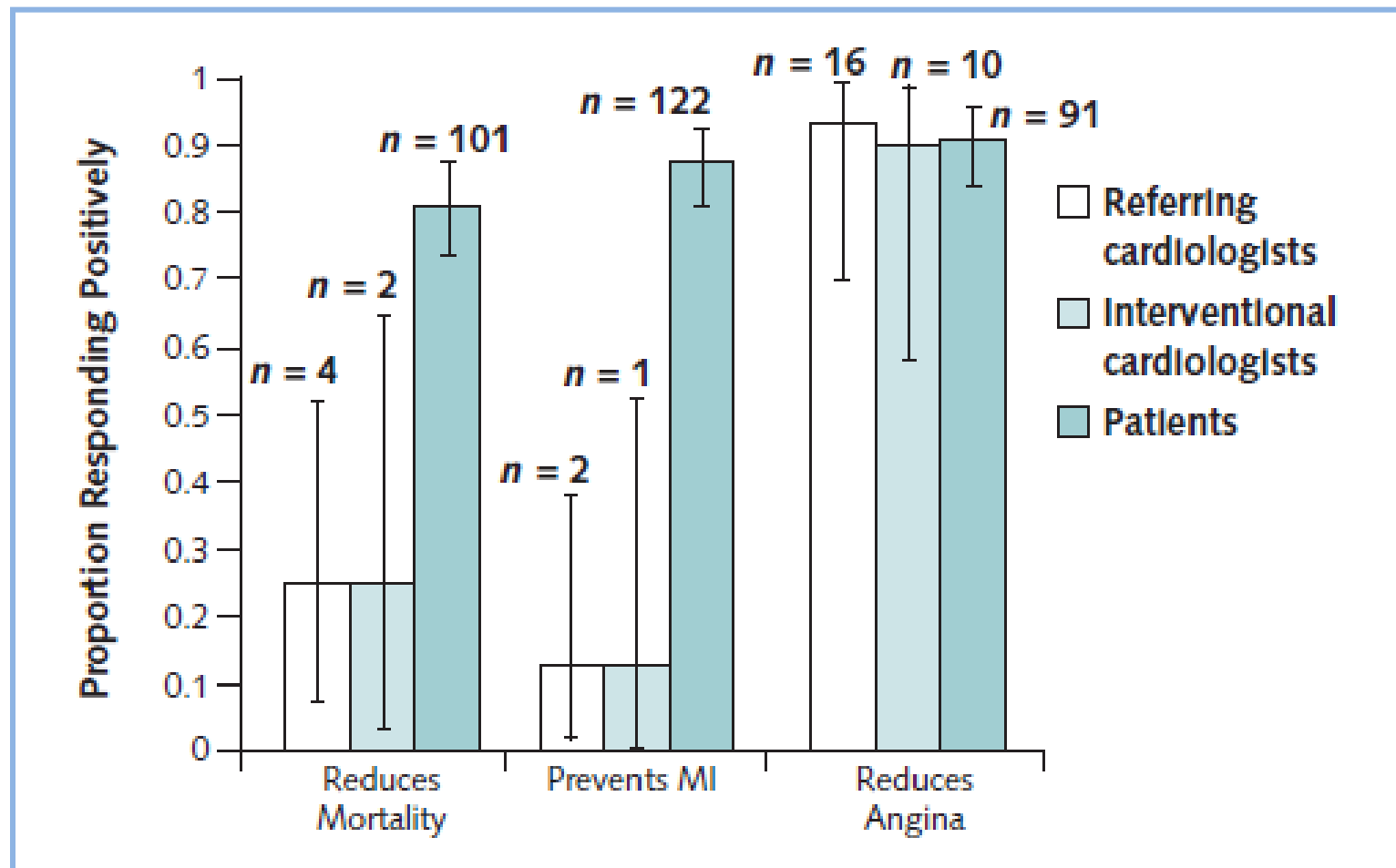
- Angina recurring or persisting after successful coronary revascularization affects a substantial number of patients, with morbidity implications;
- There may still be room for symptomatic benefit, especially given the recent advancements in medical therapy, percutaneous coronary devices, and cardiac surgery;
- The STAR Registry will assess the current incidence of hospitalization for chronic CAD, the rate of OMT and the impact of medical Rx and/or revasc on QoL in Italy

Strategies for Follow-up and Management in Symptomatic Patients after Revascularization

	Class ^a	Level ^b	Ref. ^c
Stress imaging (stress echo or MPS) should be used rather than stress ECG.	I	A	12, 269
It is recommended to reinforce OMT and life style changes in patients with low-risk findings (+) at stress testing.	I	B	14, 43, 270
With intermediate- to high-risk findings (++) at stress testing, coronary angiography is recommended.	I	C	—
Emergent coronary angiography is recommended in patients with STEMI.	I	A	94
Early invasive strategy is indicated in high-risk NSTEMI-ACS patients.	I	A	60
Elective coronary angiography is indicated in low-risk NSTEMI-ACS patients.	I	C	—

(+) Low-risk findings at stress imaging are ischaemia at high workload, late onset ischaemia, single zone of low grade wall motion abnormality or small reversible perfusion defect, or no evidence of ischaemia.

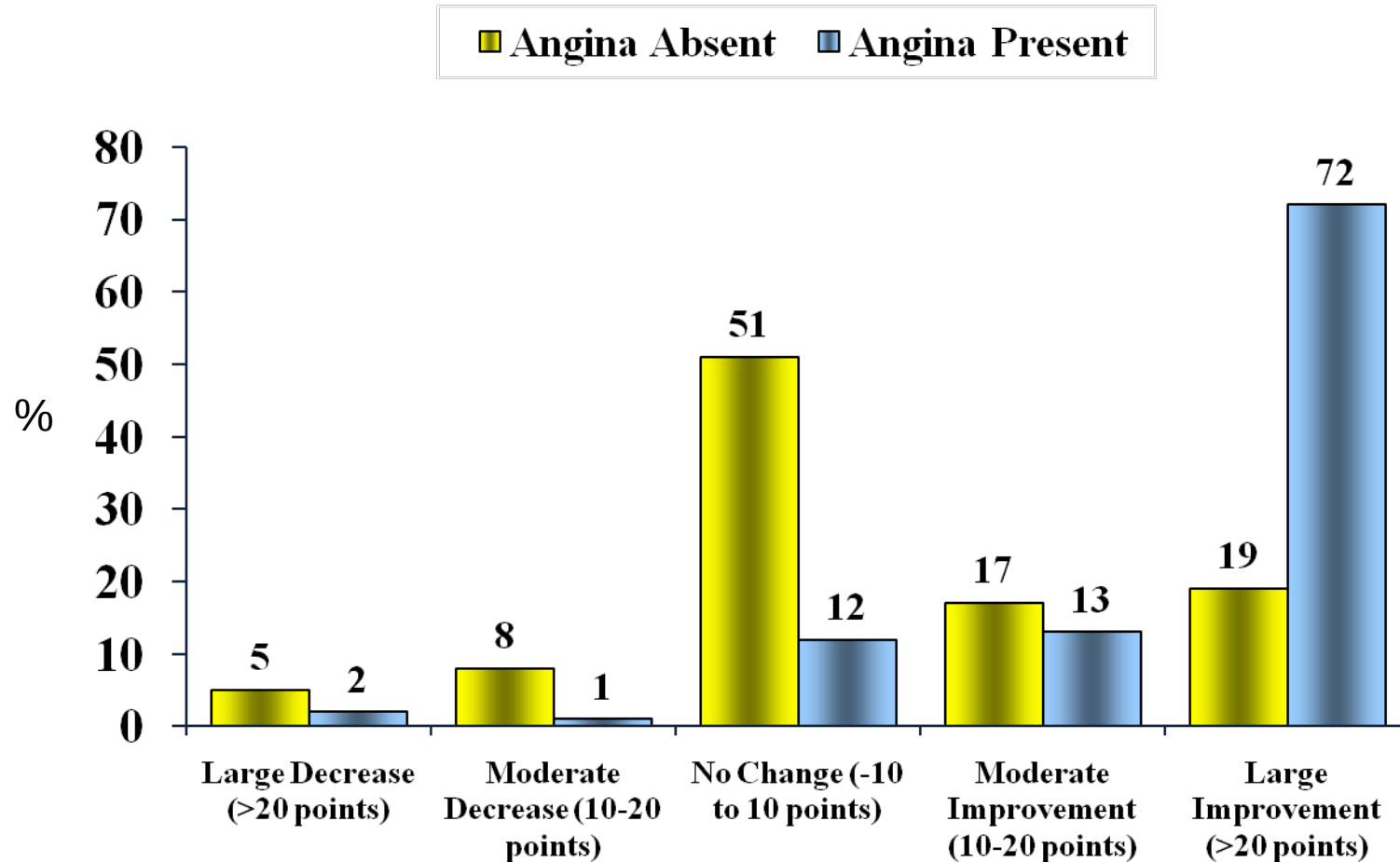
Patients' and Cardiologists' Perceptions of the Benefits of PCI for Stable Coronary Disease



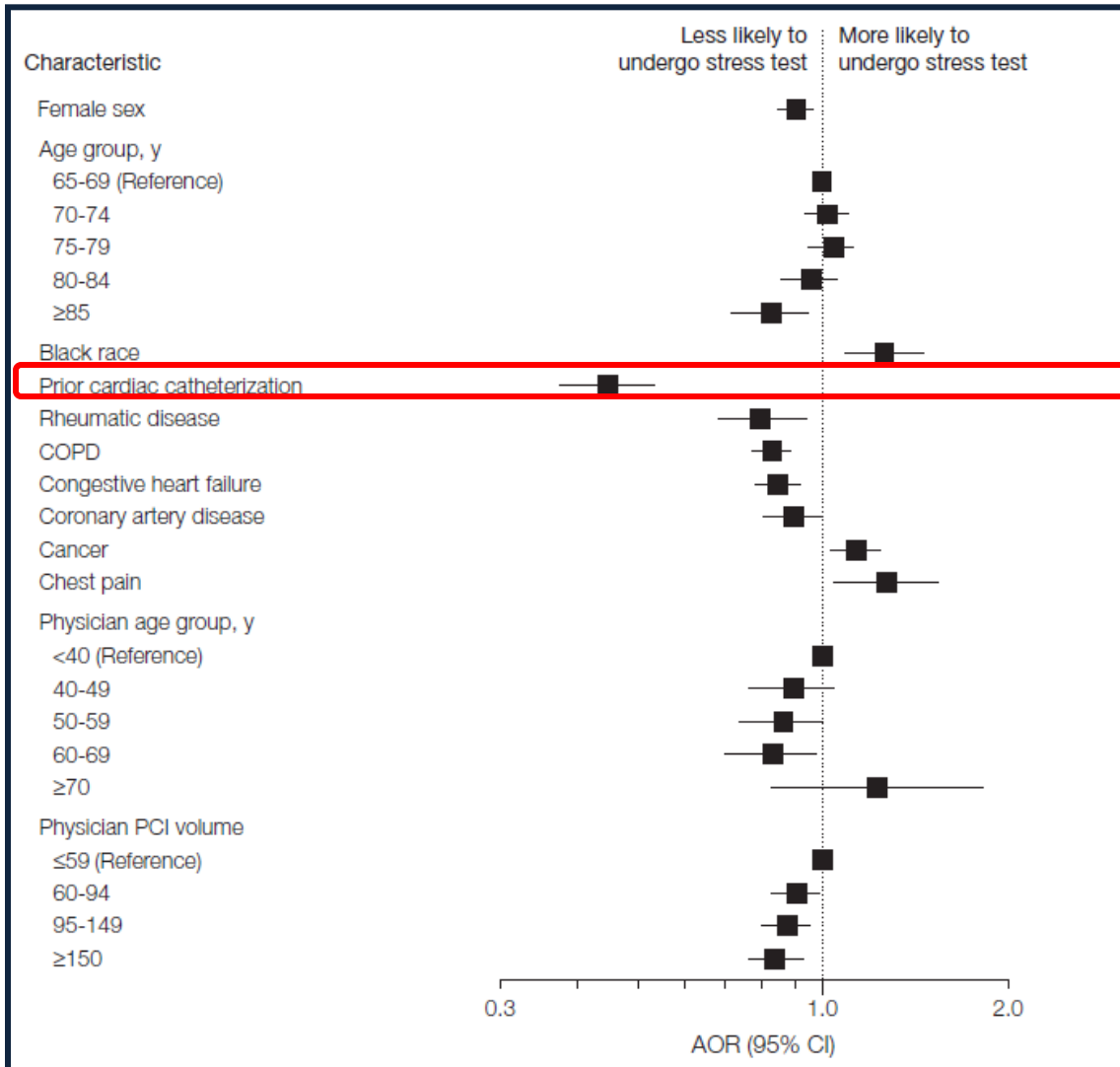
Unmet Needs of Chronic Angina

- Angina continues in many patients despite both interventional and pharmacological measures and frequently causes permanent disability
- The economic impact of angina places a huge burden on patients, their families, the healthcare system, and society

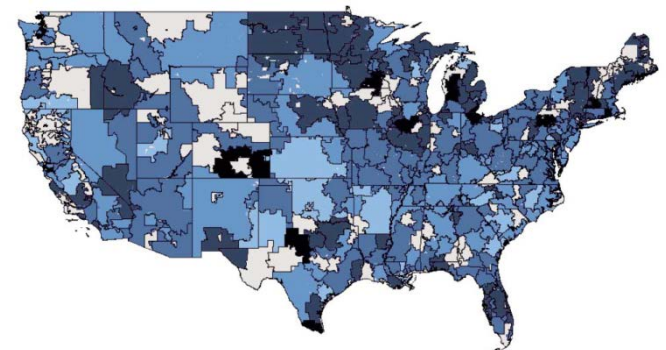
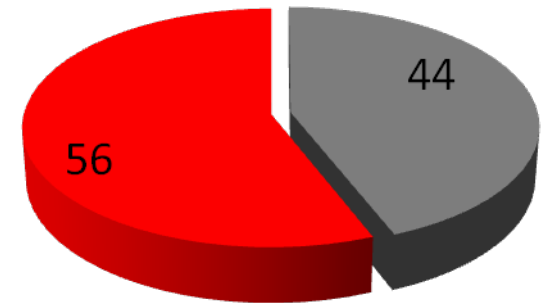
Predictors of Quality-of-Life Benefit After Percutaneous Coronary Intervention



Frequency of Stress Testing to Document Ischemia Prior to Elective PCI



■ Stress Test
■ No Stress Test



Health Outcomes

