DEPARTMENT OF NONINVASIVE CARDIOVASCULAR IMAGING AND FUNCTIONAL DIAGNOSTIC

Сърдечна рехабилитация при пациенти след ОКС

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Албена

Role of Cardiac Rehabilitation in Secondary Prevention

Конфликт на интереси: НЕ

Прогноза след ОМИ

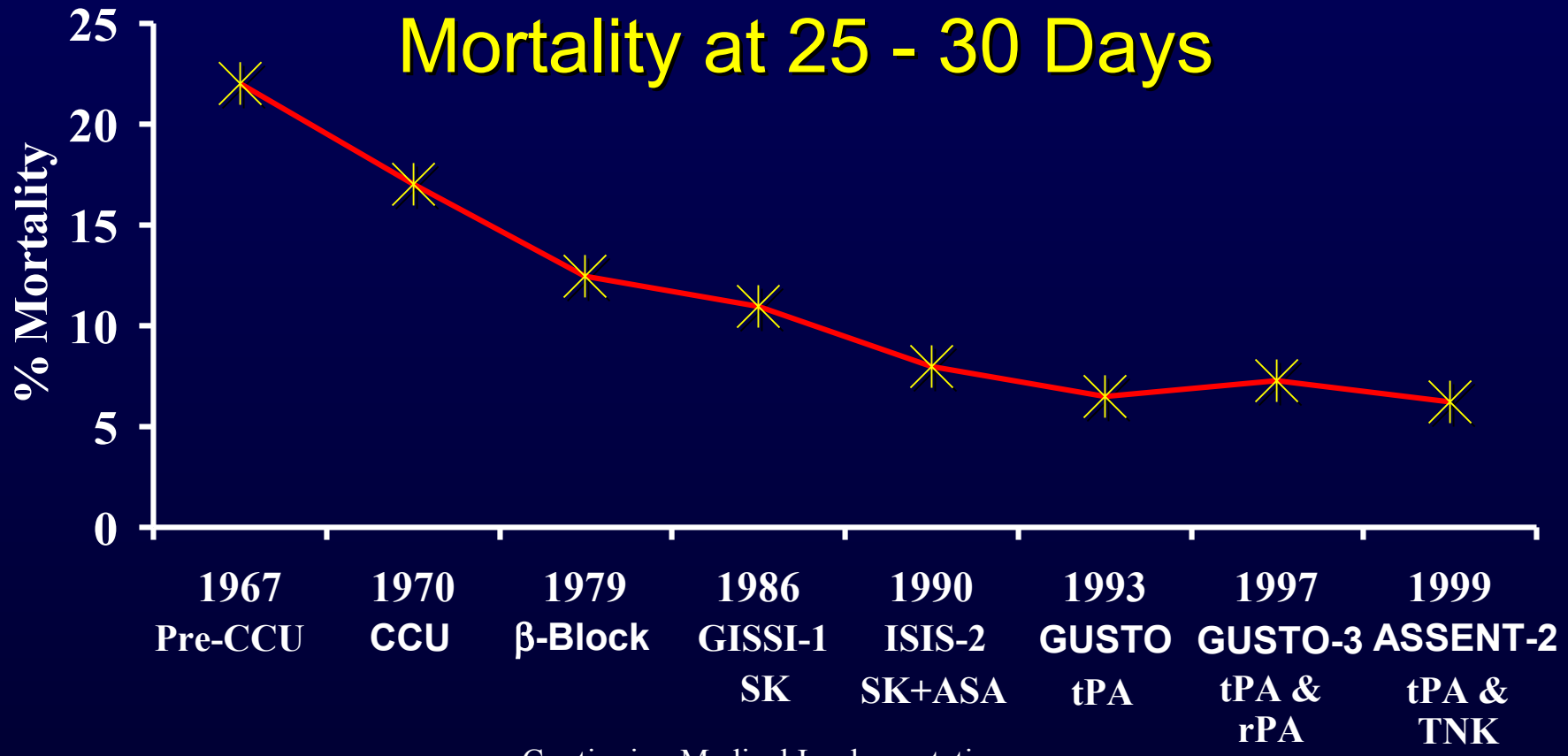
- Смъртност след ОМИ до 1 год – 10 % , като в последствие -5% на година
- Причини за смъртността:
- 85 % поради ССЗ

  - 50 % - ВВС

  - 50 % през първите 3 мес.

  -33% през първите 3 седц

Ранна смъртност след ОМИ

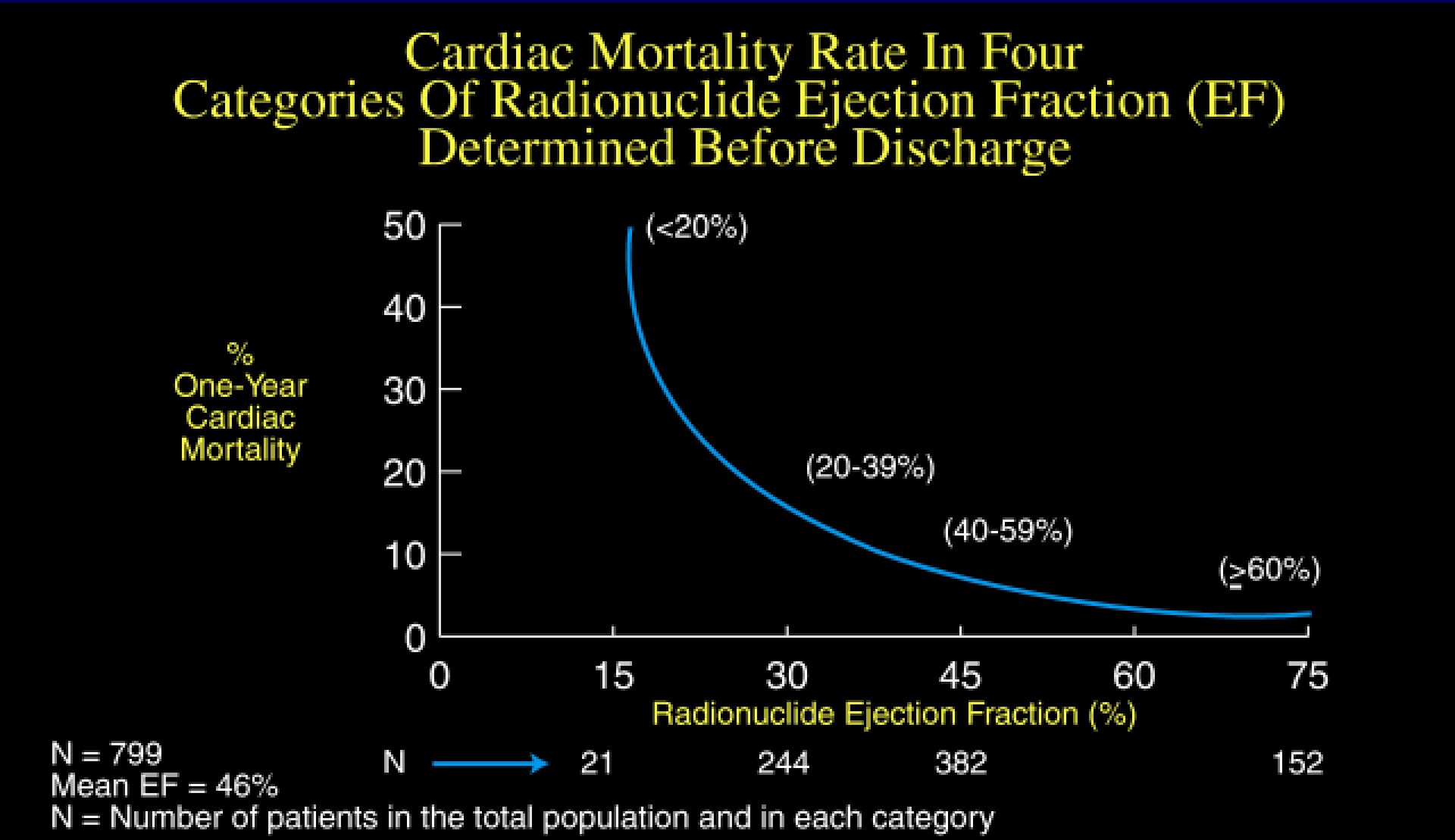


Роля на сърдечната рехабилитация при вторична превенция

Оценка на риска

- Historical
- Clinical
- ECG
- Lab
- Non-Invasive Testing
  - LV function LVEF < 40 %
  - Residual ischaemia
- Invasive Testing
  - Cardiac Catheterization
  - EPS

ЛК функция определя прогнозата



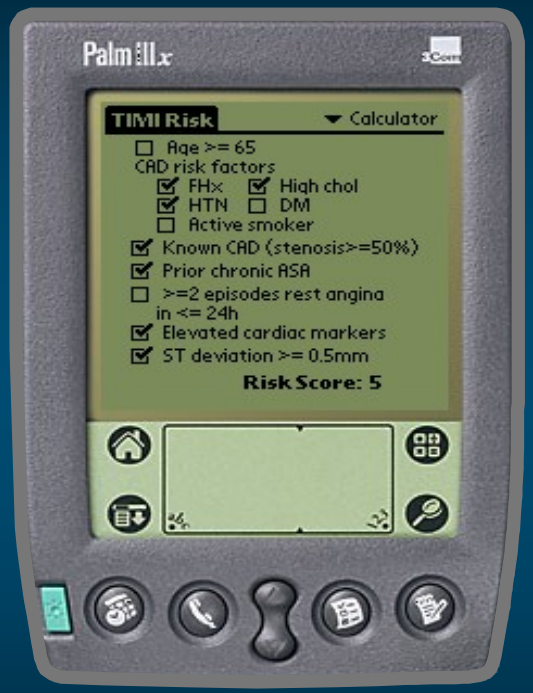
Acute Phase Risk Stratification: Pre-infarction characteristics

- Age > 70
- Prior myocardial infarction
- Female gender
- Hypertension
- History of CHF
- Hyperlipidemia
- Diabetes
- Race
- Clinical Criteria

- ECG Criteria
- Chest x-ray-cardiomegaly
- Markedly elevated cardiac enzymes
- Elevated BUN
- Hemodynamic Criteria
- Complications
  - VSD/PMD-rupture
  - Myocardial rupture

TIMI Risk Score for UA/NSTEMI
7 Independent Predictors

- Age ≥ 65 years
- ≥ 3 CAD risk factors
  (↑ chol, FHx, HTN, DM, smoking)
- Prior CAD (cath stenosis >50%)
- ASA in last 7 days
- ≥ 2 Anginal events ≤ 24 hours
- ST deviation
- Elevated cardiac markers (CK-MB or troponin)



Antman et al. *JAMA*. 2000;284:835. Available at: *www.timi.org.*

Figure 6

TIMI Risk Score for STEMI

Historical	
Age 65-74	**2 points**
≥ 75	**3 points**
DM/HTN or angina	**1 point**
Exam	
SBP < 100	**3 points**
HR >100	**2 points**
Killip II-IV	**2 points**
Weight < 67 kg	**1 point**
Presentation	
Anterior STE or LBBB	**1 point**
Time to rx > 4 hrs	**1 point**
Risk Score = Total	**(0 -14)**

(FRONT)

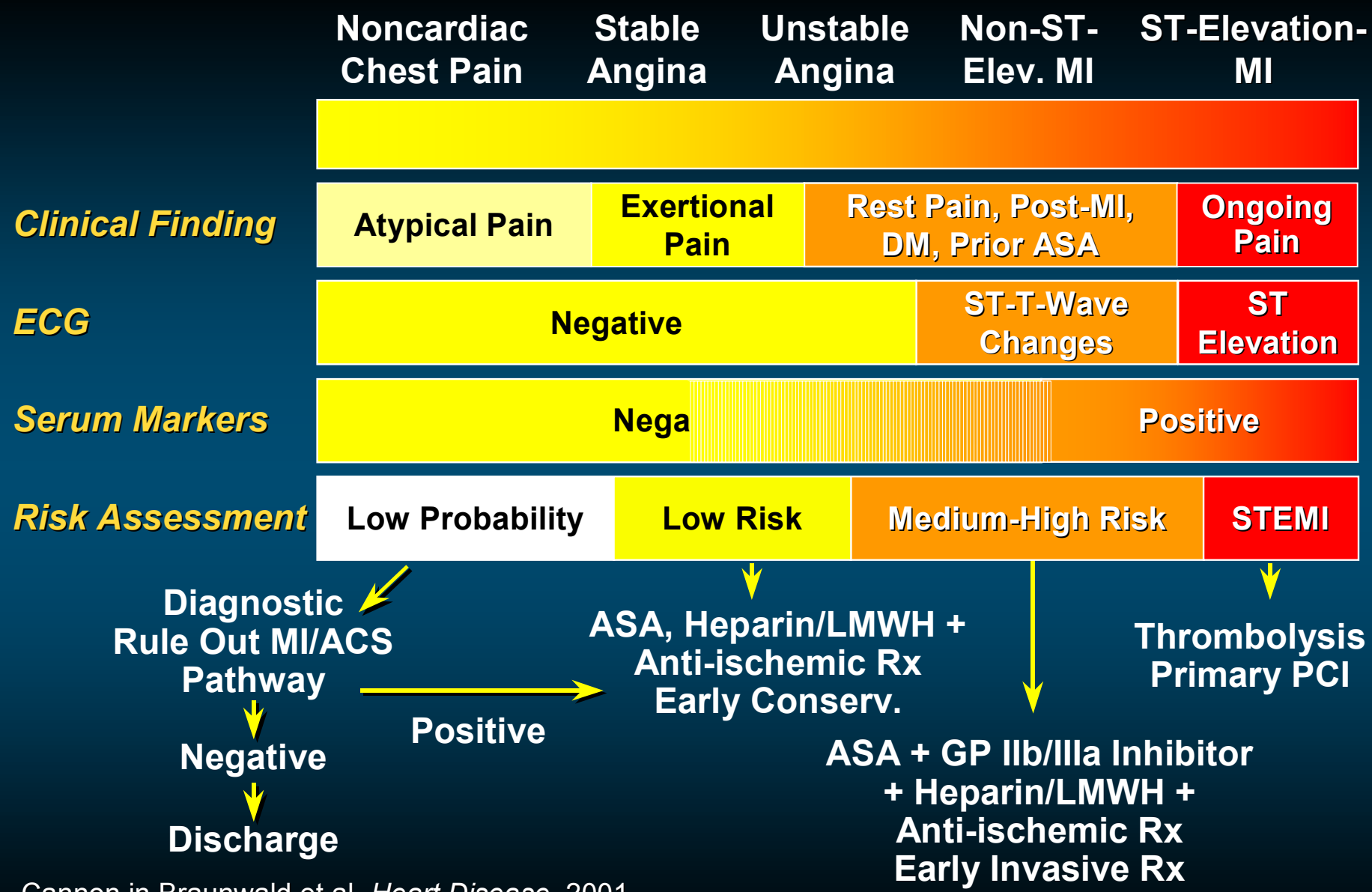
Risk Score	Odds of death by 30D*	
0	**0.1**	**(0.1-0.2)**
1	**0.3**	**(0.2-0.3)**
2	**0.4**	**(0.3-0.5)**
3	**0.7**	**(0.6-0.9)**
4	**1.2**	**(1.0-1.5)**
5	**2.2**	**(1.9-2.6)**
6	**3.0**	**(2.5-3.6)**
7	**4.8**	**(3.8-6.1)**
8	**5.8**	**(4.2-7.8)**
>8	**8.8**	**(6.3-12)**

*referenced to average mortality
(95% confidence intervals)

(BACK)

Acute Mortality Reduction

- Early Recognition of Symptoms
- Pre -Hospital Resuscitation of Sudden Death
- Fast-Track Protocol for Thrombolytic Therapy
- Code STEMI – Direct PCI protocols
- Optimal Use of Adjunctive Therapy
- Monitoring for Complications
- Evidence Based Risk Stratification
- Appropriate Revascularization for NSTEMI



Cannon in Braunwald et al. *Heart Disease.* 2001.

Acute Phase Risk Stratification: Physical Examination

- Clinical assessment of LV dysfunction
  - No history of CHF
  - No CHF with index MI
  - No LBBB, pacemaker or LVH with ST-TΔ's
  - Absence of Q waves-site of MI or outside index territory
  - 91 % predictive value of EF ≥ 40%
- Killip classification
- Hemodynamic classification
- Mechanical complications

Clinical Signs of LV Dysfunction

- Hypotension
- Pulsus alternans
- Reduced volume carotid
- LV apical enlargement/displacement
- Sustained apex - to S2
- Soft S1
- Paradoxically split S2
- S3 gallop (not S4 = impaired LV compliance)
- Mitral regurgitation
- Pulmonary congestion
  - rales

Acute Phase Risk Stratification: Importance of LV dysfunction

Killip Classification	% patients	Mortality (%)
I No CHF	**30-50**	**5**
II Rales, S3, Pulmonary venous hypertension	**33**	**15-20**
III Pulmonary edema	**15**	**40**
IV Cardiogenic shock	**10**	**80-100**

Acute Phase Risk Stratification: Importance of LV dysfunction

Forrester Hemodynamic Classification	Mortality % (Clinical Dx)	Mortality % (Hemodynamic Dx)
I PCW < 18 CI > 2.2	**1**	**5**
II PCW > 18 CI > 2.2	**11**	**9**
III PCW < 18 CI < 2.2	**18**	**23**
IV PCW > 18 CI < 2.2	**60**	**51**

Прогностична оценка

- Timing of revascularization
- Size of MI
- Extent of LV dysfunction
- Extent of CAD
- Recurrent ischaemia
- Mechanical complications
  - Mitral regurgitation
  - VSD
  - Aneurysm
  - Rupture

Acute Phase Risk Stratification: Electrocardiographic features

- Anterior MI/ Persisting ST elevation
- Q waves in multiple leads
- Non - Q MI
- LVH
- Reciprocal (anterior) ST depression
- Persisting ST depression
- Prolonged QT
- Conduction defects/ heart block
- Sinus tachycardia/atrial fibrillation

Impact of Conduction Disturbances on Prognosis

Type of Conduction Block	Incidence (%)	Progression to CHB (%)	Mortality Rate (%)
None		6	15
LAHB	5	3	27
LPHB	1	0	42
RBBB + LAHB	5	46	45
RBBB + LPHB	1	43	57
RBBB	2	43	46
LBBB	5	20	44

Мениджмент след ОМИ
NB: Phases compressed and abbreviated with early invasive strategies and direct PCI

- Acute Evaluation Phase
- CCU Phase
- Hospital Phase
- Pre-discharge Phase
- Convalescence
- Long Term Management
  - Secondary prevention critical to preserve acute mortality benefits

Brief duration leaves little time for comprehension and education

Менижмент на пациентите след ОМИ -Фази

- Acute Evaluation Phase
  - ASA
  - Plavix (NSTEMI/PCI)
  - Glycoprotein IIB/IIIA inhibitors
  - Heparin, LMWH
  - Thrombolytics (STEMI,LBBB)
  - Direct PCI
  - IV β-blocker
  - IV NTG
- Complication Surveillance
  - CHF
  - Pericarditis
  - Recurrent ischaemia
  - Mechanical complication
    - ventricular septal rupture
    - papillary muscle dysfunction or tear
  - LV thrombus

Role of Echocardiography

- LV function
- Complications of MI
  - Thrombus
  - Aneurysm
  - Papillary muscle rupture/dysfunction
  - Septal rupture
  - Free wall rupture

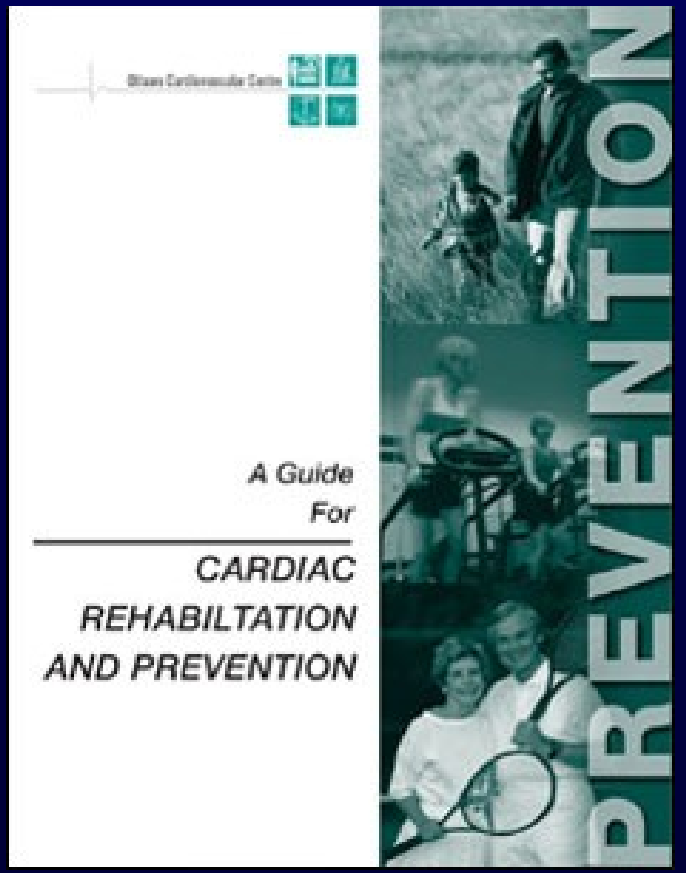
Post MI Management-Phases

Post CCU- Early ambulation

- ASA
- ∀ β-blocker
- ACE- inhibitor
- Lipid lowering
  - usually statin
- Anti-coagulation
  - Atrial fib/DVT/CHF/LVT
- Telemetry for arrhythmia
- Echo for LV function/thrombus
- Patient education & counseling
  - dietary
  - risk factors
  - further Ix
- Screening for complications
- Risk stratification

Насоки за сърцечна рехабилитация и превенция

- Self contained
- Comprehensive
- Downloadable
- Printable
- Customizable
- See “Cardiac Rehab” button on website www.cvtoolbox.com



Редукция на ССР : „Коктейл“ за вторична превенция

- **ASA (Plavix post ACS/PCI)**
- **Lipid Targets**
  - TC≤4.5, TG≤1.7, HDL≥1.2, LDL≤2.0 (1.8) TC/HDL < 4 (3)
- **ACE inhibitor**
  - Ramipril 2.5→10 mg
  - Perindopril 2→8 mg
  - Trandolapril 1→4 mg
- **Beta-blocker for post- MI or LV dysfunction**

Потенциален кумулативен ефект на вторичната превенция след ОМИ

	RRR	If Event Rate	If Event Rate
None		**8%**	**16%**
ASA	**25%**	**6%**	**12%**
β -Blockers	**25%**	**4.5%**	**9.0%**
Lipid lowering	**30%**	**3.0%**	**6.0%**
ACE-inhibitors	**25%**	**2.3%**	**4.6%**
Cardiac Rehab	**25%**	**1.7%**	**3.4%**

CUMULATIVE BENEFITS ARE LIKELY TO BE IN EXCESS OF 78% RRR, WHICH IS SUBSTANTIAL

Adapted from Yusuf, S. Two decades of progress in preventing vascular disease. Lancet 2002; 360: 2-3.

На какво ниво ще очакваме най- добър резултат от мерките за превенция ?

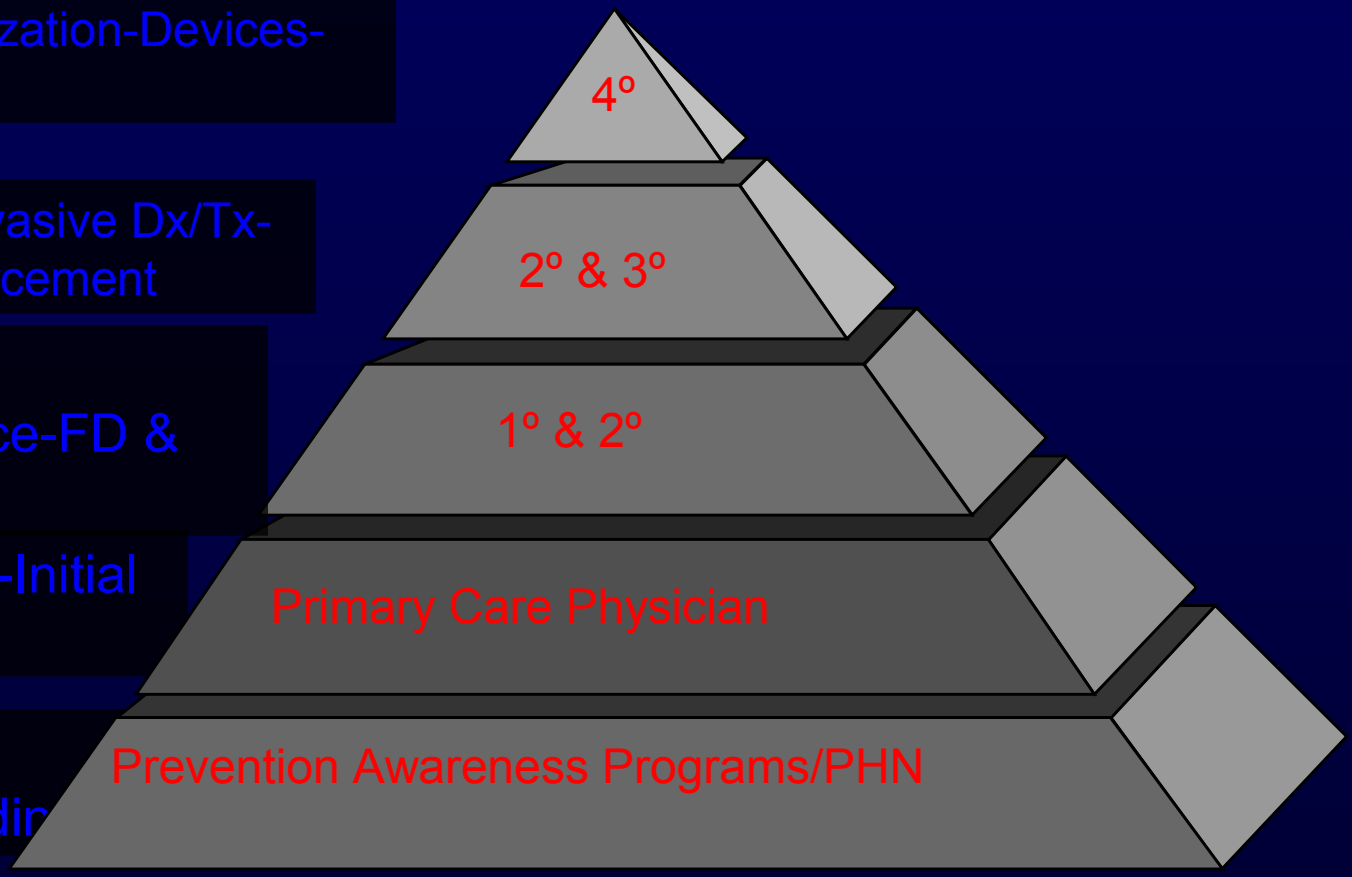
Interventions-Revascularization-Devices-Procedures

Specialist/Cardiologist-Invasive Dx/Tx-Monitoring/Rehab/Reinforcement

Risk Stratification-Rx Optimization/ Adherence-FD & Specialist

Recognition-Screening-Initial Therapy- Family MD

Community Based Awareness/Understandir



Менижмент след ОМИ: Pre-discharge BET

- Value of pre-discharge stress test
  - useful to identify those at risk for an early event
  (UAP, recurrent MI, arrhythmia, sudden death)
  - low level < 6 METS, 70 % MPHR or symptom limited
- Predictors of poor outcome
  - ischaemic ST depression > 1 mm is inconsistent predictor of mortality
  - poor exercise tolerance < 3 minutes doubles 1 year mortality (7% to14%)
  - inability to exercise or contra-indication to TMT identifies High Risk patient.

Мениджмент след ОМИ : Фаза на възстановяваване

At time of discharge patient should be on:

- ASA unless contra-indication
- Plavix if PCI/NSTEMI (duration minimum1 year)
  - Longer duration of Plavix if DES in critical location or complex lesion

  β-blocker unless contra-indication
- Ace inhibitor for CHF or LV dysfunction
  - All for vascular protection?
- Statin for LDL to < 2.0 mmol/L (minimum 50% reduction)

Мениджмент след ОМИ : Фаза на възстановяваване

Late Risk Stratification - 4 to 8 weeks
(Assessment of residual ischaemia)

- TMT
- Stress Nuclear Perfusion Study
  - uninterpretable ECG
  - Equivocal TMT
- Persantine Nuclear Perfusion Study
  - inability to exercise
  - LBBB
  - NB!!! Contra-indicated in asthma

Indications for Angiography

NB: In interventional environment many patients undergo early angiography

- High Risk
  - extensive ECG changes
  - anterior/ infero-posterior/ prior MI
  - Prior MI
- Residual ischaemia
  - post MI angina
  - positive TMT/ perfusion scan
  - non-Q MI
  - ischaemia at a distance
- Complicated MI
  - CHF/ flash pulmonary edema
  - shock
  - heart block
  - RBBB
  - sustained ventricular arrhythmias
- Anxiety/ physical labor/ young age

AHA/ACC Secondary Prevention Guidelines: 2010 Update

- Smoking cessation
- Anti-platelet therapy
- Beta blocker post-MI of LV dysfunction
- ACE-inhibitor (or ARB) if LVEF ≤ 40%
  - Add aldosterone blockade if diabetes or CHF
- Statin with LDL-C goal of < 100mg/dL
  - Goal < 70 mg/dL for highest risk patients
  - Add second agent as needed

- Weight loss of 5-10% if BMI $\geq$ 30 kgm^2
- Physical activity at least 30 minutes per day
- Medically supervised exercise program for high risk patients (cardiac rehabilitation)
- Influenza vaccine
- Patients covered by these guidelines include those with established coronary and other atherosclerotic vascular diseases, including peripheral arterial disease, atherosclerotic aortic disease, and carotid artery disease

Meta-Analysis: Тренировки за вторична превевнция

- 8440 CHD patients randomized to exercise-based rehab programs
- 27% reduction in all-cause mortality
- 31% reduction in CHD mortality
- No evidence of reduction in non-fatal CHD

Jolliffe et al, *The Cochrane Library* 2003:Issue 4

Ползи – AHCPR Report

- Reduces cardiovascular and total mortality
- Does not increase non-fatal reinfarction rate
- Improves myocardial perfusion
- May reduce progression of atherosclerosis when combined with aggressive diet
- No consistent effects on hemodynamics, LV function or visible collaterals

Ползи – AHCPR Report

- No consistent effects on cardiac arrhythmias
- Improves exercise tolerance without significant CV complications
- Improves skeletal muscle strength and endurance in clinically stable patients
- Promotes favorable exercise habits
- Decreases angina and CHF symptoms

Outcomes in Cardiac Rehabilitation
AHCPR Guidelines

1. Smoking cessation
2. Lipid management
3. Weight control
4. Blood pressure control
5. Improved exercise tolerance
6. Symptom control
7. Return to work
8. Psychological well-being/stress management

Мениджмент след ОМИ : Olmsted County Study

This study was undertaken to:

- Examine the utilization of rehabilitation after MI in the community and test the hypothesis that women and the elderly were less likely to participate
- Examine the impact of participation on survival

Witt B et al. *JACC* 2004;44:988-996

Methods

- Cases validated by epidemiologic criteria: cardiac pain, enzymes, MN coding of ECG
- CV risk factors, comorbidity (Charlson index), reperfusion (thrombolysis or PTCA) within 24 hours) included in analysis

Methods

- Participation in cardiac rehabilitation defined as presentation to 1st visit for enrollment in a structured outpatient program after the index MI date. Only one program in Olmsted Co during the study period; visits noted in the medical record.
- Study period: 1982-98
- Follow-up for death by passive surveillance

Methods

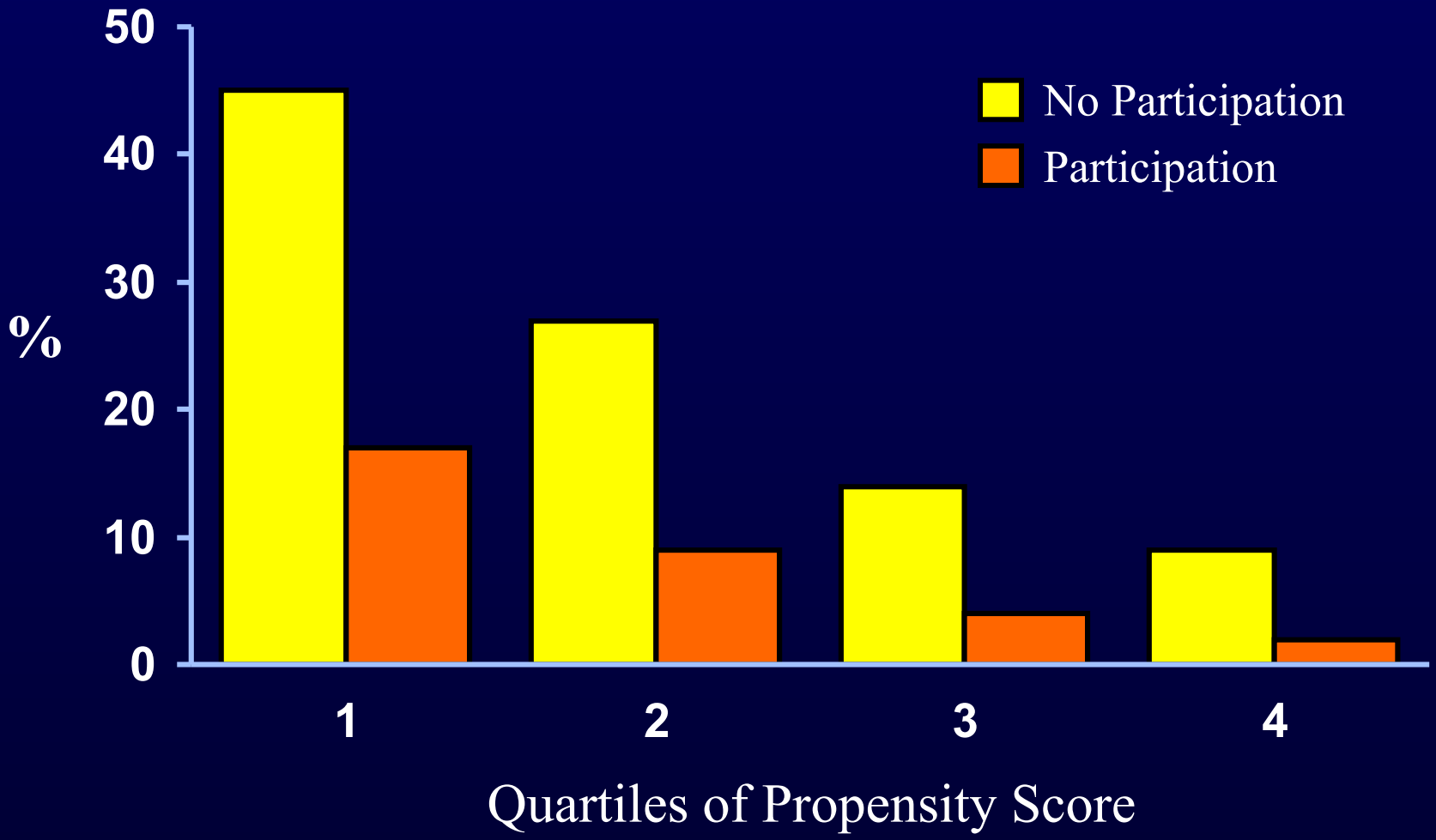
- Observational study, so data adjusted for propensity to participate in cardiac rehabilitation

Generating score for propensity to participate to rehabilitation

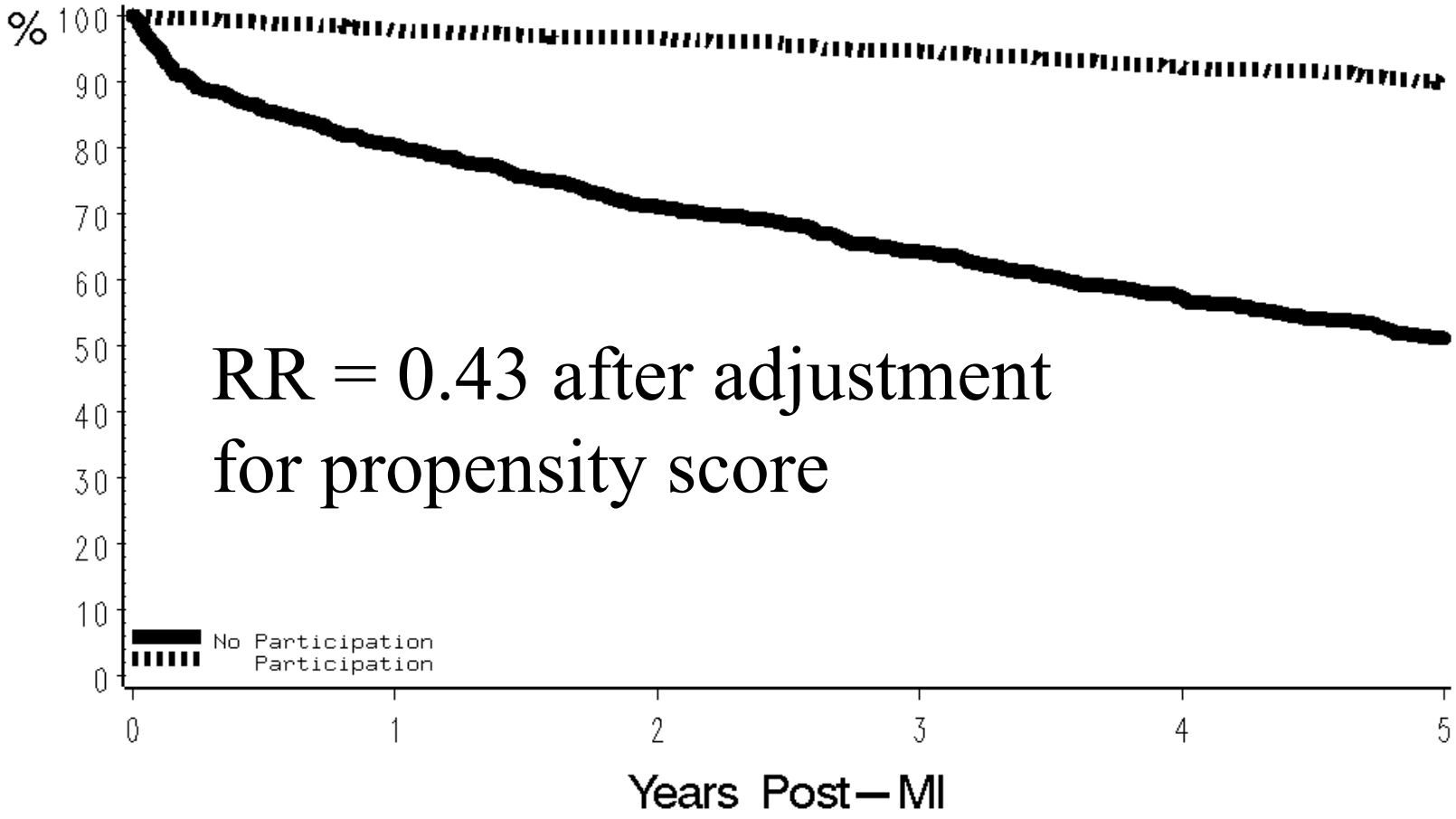
16 variables

- Sex
- Age
- Hypertension
- Hyperlipidemia
- Diabetes
- Tobacco
- BMI
- Comorbidity index
- History of personal CHD
- History of familial CHD
- Killip class
- Year of MI
- Peak Creatine Kinase
- Cardiologist part of care
- Reperfusion therapy
- EF measured post-MI

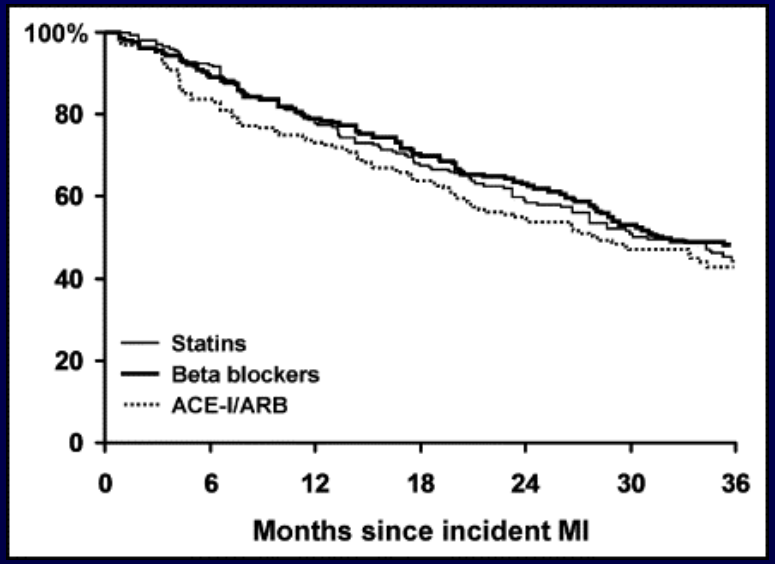
Death within 3 Years



Adjusted Survival Benefit Associated with Participation



Medication Adherence

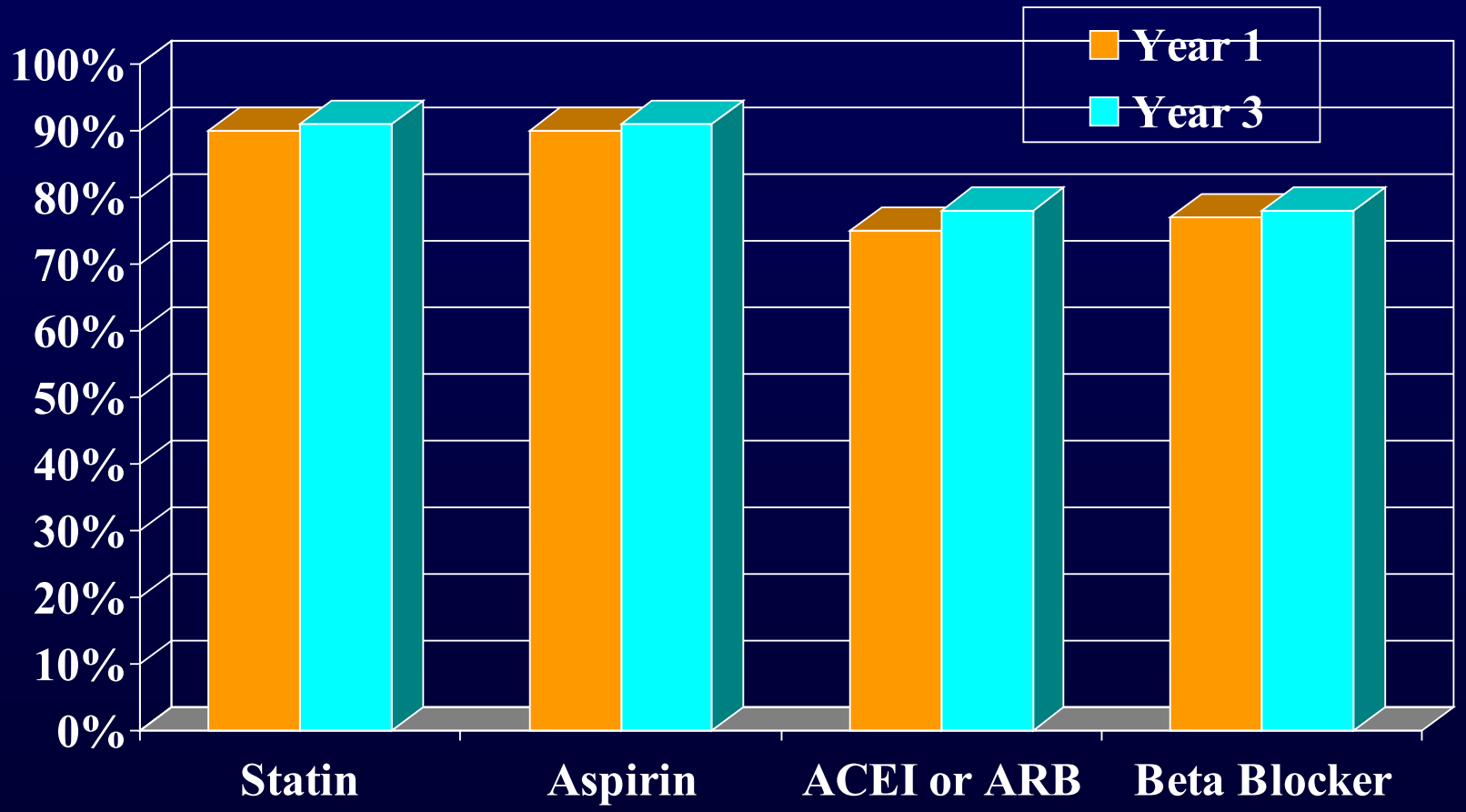


- Statins: 75% at discharge, 44% 3 years
- BB: 84% at discharge, 48% at 3 years
- ACE: 62% at discharge, 43% at 3 years

Am J Med. 2009 Oct;122(10):961.e7-13.

Medication Adherence with Cardiac Rehabilitation

All patients, not just post-MI



Squires et al, *JCRP* 2008;28:180-186

Cardiac Rehabilitation in 2014

- In the era of emergent PCI, do we still need cardiac rehabilitation?

- Patients with emergent PCI have little myocardial damage, preserved LV function, and little residual ischemia, but …

Cardiac Rehabilitation and Mortality Impact in PCI

- Mayo Clinic CR-PCI Study
  - Post PCI patients, 1994-2008
  - Cardiac rehabilitation vs no CR
  - Adjusted Propensity Score Analysis techniques
  - All-cause mortality 45% lower for CR participants
  - Mortality benefit began in year one and persisted

Presented at ACC Annual Meeting, March 2010

Continued Need for Cardiac Rehabilitation in 2014

- Burden of CHD is shifting to elderly and women
- Elderly patients have more co-morbidities, poorer exercise capacity, and are more likely to have had prior events
  - 450,000 of 1.1 million MIs expected in 2005 in US will be *recurrent* events
- Women appear to do less well with CABG and PCI

Cardiac Rehabilitation 2014

- Doesn't everyone already go to cardiac rehabilitation?
- Participation rates post-MI in Rochester in 1982-1998 were ~ 75% for men and 40% for women
  - Similar in 2010
  - Highest rates post-CABG, lowest after elective PCI
- Rates of 13 - 41% for men and 7 - 22% for women reported in various regional and national surveys

Increasing Cardiac Rehabilitation Utilization

- Improve reimbursement for cardiac rehabilitation
- "Pay for performance" for guideline-based therapy
  - Increase reimbursement for in-hospital care if referral to cardiac rehab is included (or decrease if referral not made)

Cardiac Rehabilitation in 2014

- Wouldn't most patients with cardiac disease benefit from rehabilitation program?

Characteristics of Various Cardiac Diseases and Procedures

	MI	CABG	CHF	OHT	AVR/ MVR
↓ Functional Capacity	±	+	+	+	+
Coronary atherosclerosis	+	+	±	±	±
Sternotomy	-	+	-	+	+
↓ LV Function	±	±	+	-	±

Benefits of Cardiac Rehabilitation

- Improved survival
- Improved functional capacity
- Improved CAD risk factor control
- Reduced depression

Though originally designed for coronary artery disease patients, there is accumulating evidence that patients with other cardiac diseases will also benefit from cardiac rehabilitation

Current Indications for Cardiac Rehabilitation (Medicare)

- Post-MI
- Post-CABG
- Angina
- PCI
- Valve replacement or repair
- Heart transplant
- Indications for CHF continue to be evaluated by HCFA

Benefits of Exercise Training After Valve Replacement

Benefits of Exercise Training After Valve Replacement

- 3 published training studies, all with favorable results in terms of VO_{2max} and exercise performance
- Other potential benefits
  - Recovery of muscular strength following sternotomy
  - Advice on management of chronic anti-coagulation
  - Monitoring of blood pressure

Stewart et al. *Chest* 2003;123:2104-2111

Cardiac Rehab after Heart Transplant

Complications of OHT

- Diminished aerobic capacity
- Muscle atrophy – pre-existing + steroids
- Weight gain
- Loss of bone mass
- Rejection – acute and chronic
- Exacerbation of CHD risk factors
- Infections
- Psychological issues
- Persistent heart failure

Exercise Capacity after OHT

- Aerobic capacity 40-50% of predicted
- Impaired heart rate, blood pressure, and cardiac output responses
- Excessive and inefficient ventilation

- Cardiac rehabilitation appears to improve exercise tolerance and ameliorate many of the physiologic abnormalities seen after OHT

Cardiovascular Benefits of Exercise Training after OHT

- Increased VO_2max ~10-25%
- Increased peak power output
- Decreased submaximal exercise ventilation
- Reduced rest and submaximal exercise BP

Squires, *Med Sci Sports Exerc* 1991; 23:686

Cardiac Rehab for Chronic Heart Failure

Meta-Analyses of Exercise Training in CHF

Rees, *Cochrane Database Syst Rev* 2004; 3:CD003331

- 29 RCTs, total n = 1,126
- Morbidity/mortality not addressed specifically
- Average increase in peak VO_2 = 2.2 ml/kg/min
- Average increase in 6 minute walk distance = 41m

Meta-Analyses of Exercise Training in CHF

Smart, *Am J Med* 2004; 116:693

- 30 RCTs, 5 non-RCTs, 9 randomized crossover trials, 37 longitudinal cohort studies
- Total n = 2,387
- Exercise training is safe, effective
- Average increase in peak VO_2 = 17%

Safety of Exercise Training in CHF

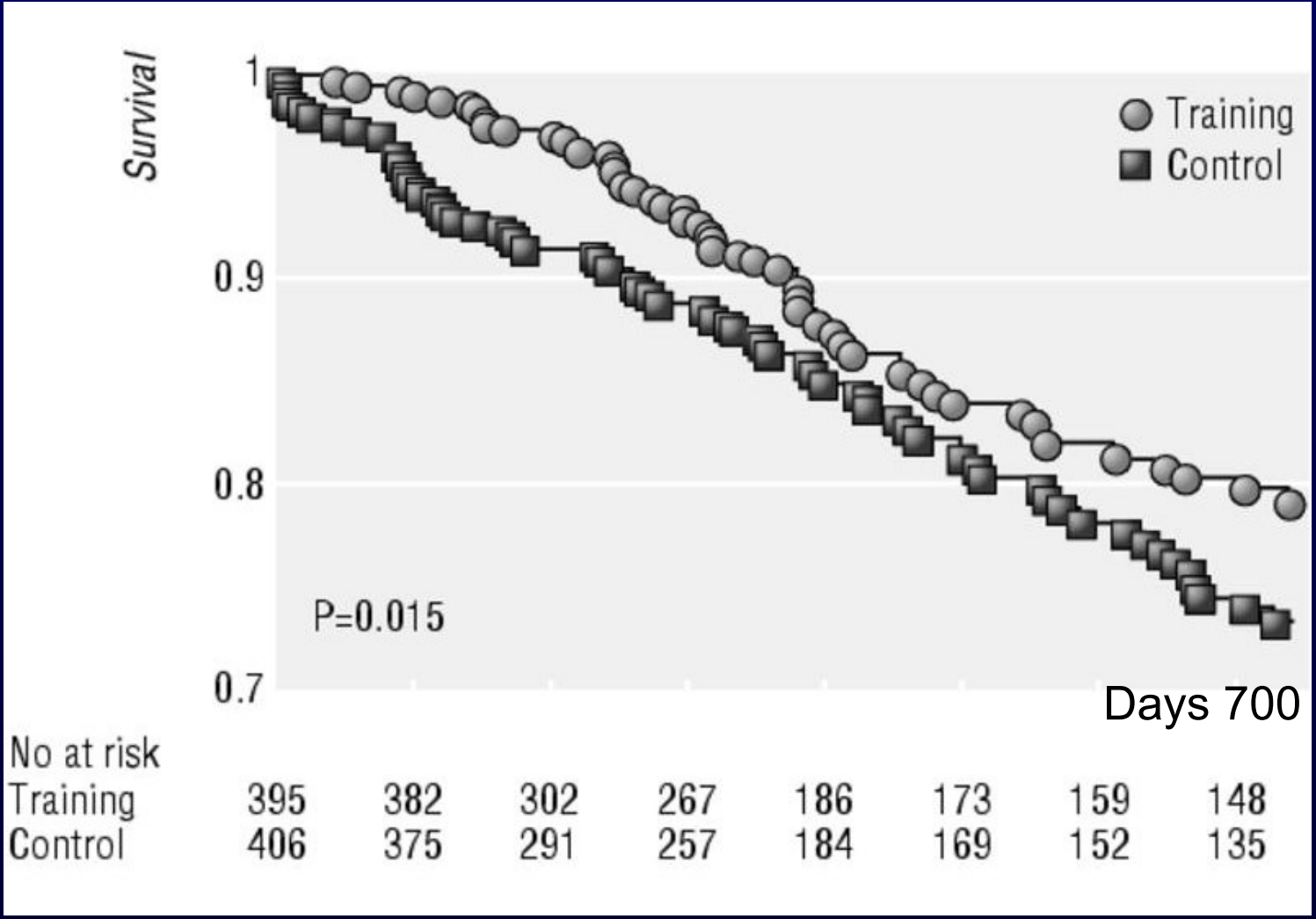
- Meta-analysis of 81 trials, n = 2,387
- >60,000 patient-hours of exercise training
- No deaths related to exercise training

Smart and Marwick, Am J Med 2004; 116:693.

Other Reported Benefits of Exercise Training in CHF

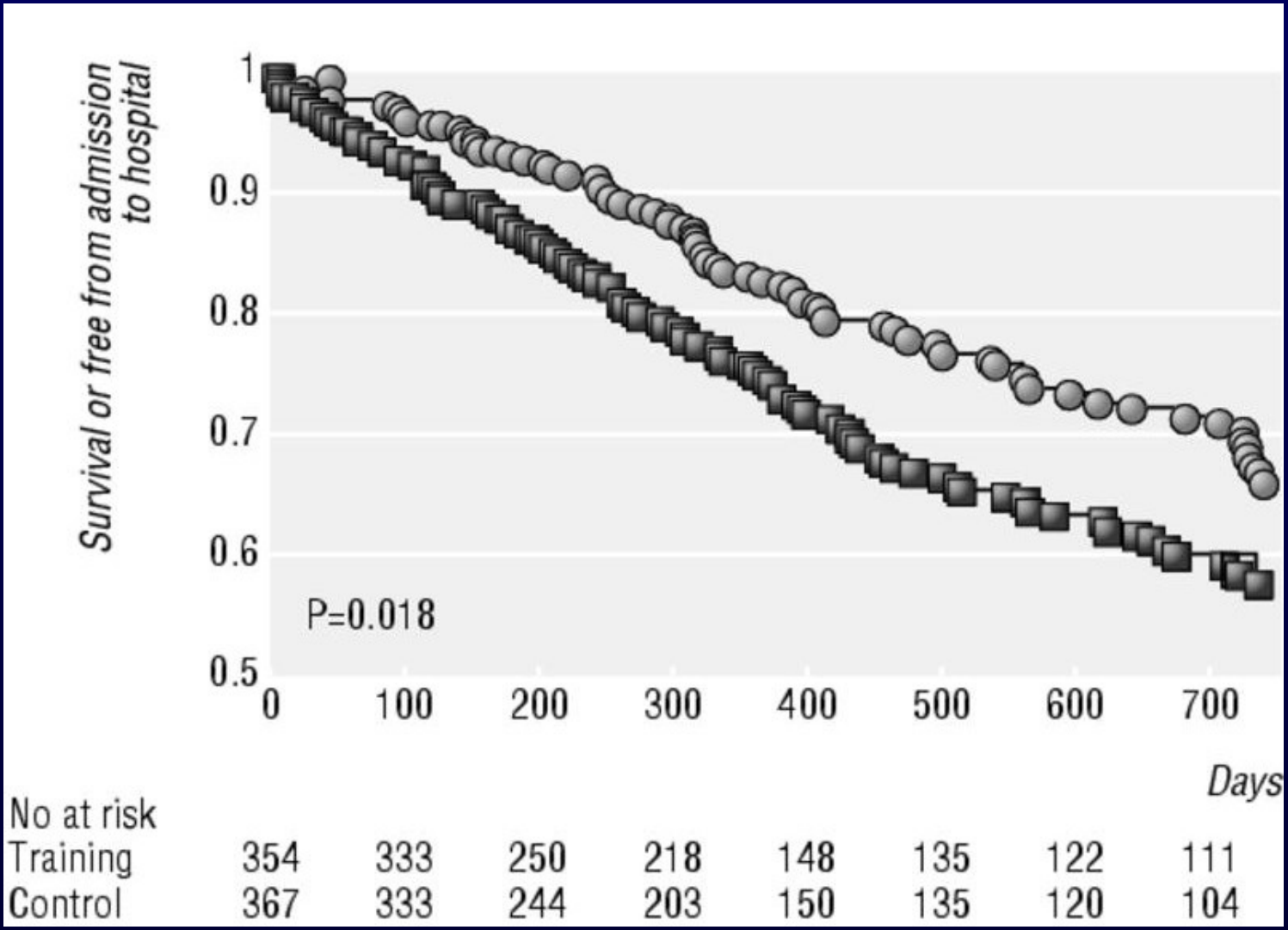
- Increased muscle oxidative capacity
- Reduced peripheral resistance
- Increased muscle strength
- Reduced neurohumoral activation
- Decreased sympathetic nerve traffic
- Increased heart rate variability
- Reduced hospitalization
- Increased survival?

Exercise and Survival in CHF



ExTraMATCH Collaborative. *BMJ* on-line 2004 January 16

Survival + Hospitalization



Exercise Training in CHF: Mortality and Morbidity Effects

- HF ACTION:

  Heart Failure and A Controlled Trial Investigating Outcomes of Exercise TraiNing
- RCT: usual care vs structured exercise training; 50 sites in US and Canada
- 5 year follow-up
- Outcomes = death, hospitalization

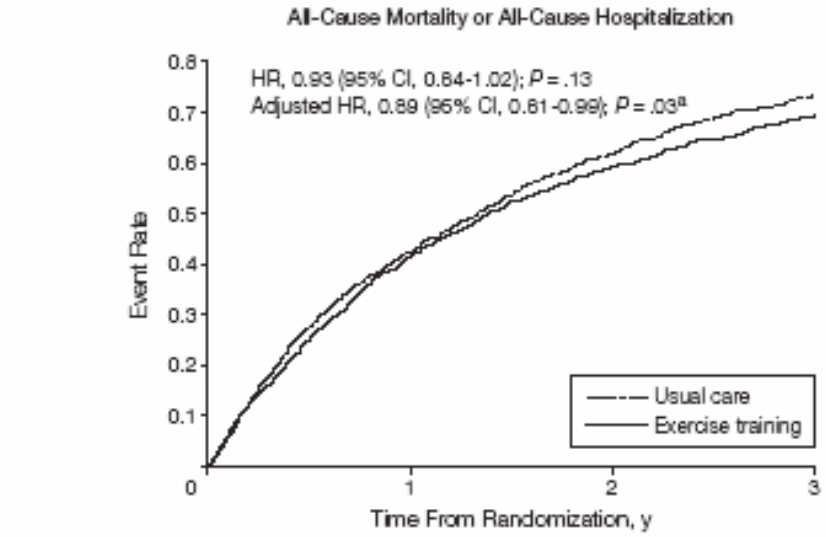
JAMA 2009; 301:1439

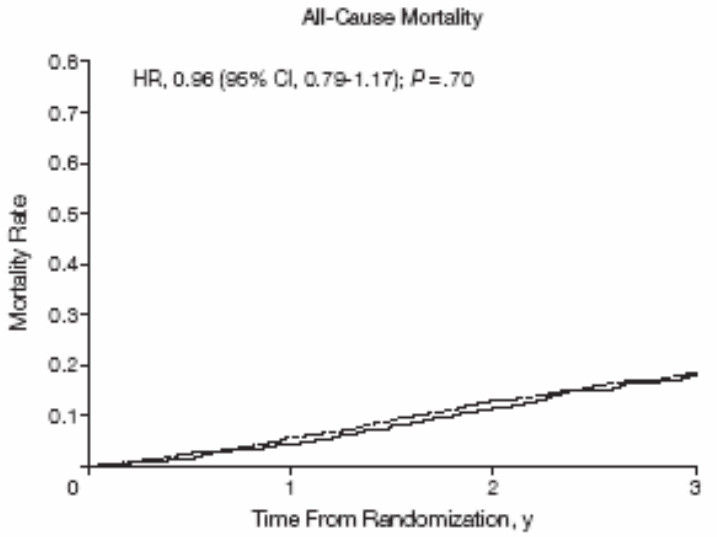
HF-ACTION Results

- N = 2,331
- 6 minute walk distance Δ (m): 12 vs 13
- VO2peak Δ (ml/kg/min): 0.1 vs 0.7
- All-cause mortality: no difference
- Modest reduction in clinical events

JAMA 2009; 301:1439

HF-ACTION Results





No. at risk				
Usual care	1172	651	337	146
Exercise training	1159	656	352	167

No. at risk				
Usual care	1172	1067	760	455
Exercise training	1159	1084	758	444

CI indicates confidence interval; HR, hazard ratio.
[a]Adjusted for key prognostic factors.

JAMA 2009; 301:1439

HF-ACTION Results

- Suboptimal adherence to exercise training; more than expected physical activity in control group
- Less training effect than in other smaller studies
- Further analyses to be performed

Conclusions of Cardiac Rehabilitation

- Cardiac rehabilitation is an important therapy for CHD
  - Essential for comprehensive CV center
- Heart transplant and valve replacements patients benefit from cardiac rehabilitation
- CHF patients also likely benefit, but not a Medicare covered service for CHF in US
  - HF ACTION will likely have negative effects on getting CHF approved for cardiac rehab

Thank you for your attention!

Cardiac Rehabilitation for CHD Equivalents?

Case Study CAD Equivalent

- 62-year old man with 1-4 block claudication
- Presenting in October, 2006
- Previous treatment for CAD in 1994
  - Stents to LAD and RCA
  - Reports exertional angina
  - Mildly positive adenosine sestamibi scan
- Family history of PAD (father)

Physical Exam

- Mildly decreased lower extremity pulses, otherwise unremarkable
- Blood pressure = 139/84
- Pulse = 74
- Weight = 99.5 kg
- BMI = 33.2 kg/m^2
- Smoking 20 cigarettes/day

Medications

- Lisinopril 20 mg daily
- Sildenafil 50 mg as needed for sexual intercourse
- Nitroglycerine 0.4 mg sublingual as needed for chest pain

Laboratory

- Fasting glucose = 115 mg/dL
- Total cholesterol = 237 mg/dL
- HDL cholesterol = 41 mg/dL
- LDL cholesterol = 169 mg/dL
- Triglycerides = 127 mg/dL

Table 1. Systolic Blood Pressures at Rest

	Right	Index	Left	Index
Arm	152		154	
Thigh	84	.55	111	.72
Calf	102	.66	108	.70
Ankle PT	97	.63	107	.69
Ankle DP	92	.60	106	.69

Treadmill Data

Workload = 2 MPH/10% grade

Symptom onset at 2:24/136 yards

Maximum walking time = 5:00/283 yards

Peak HR = 113 bpm

ECG negative for ischemia

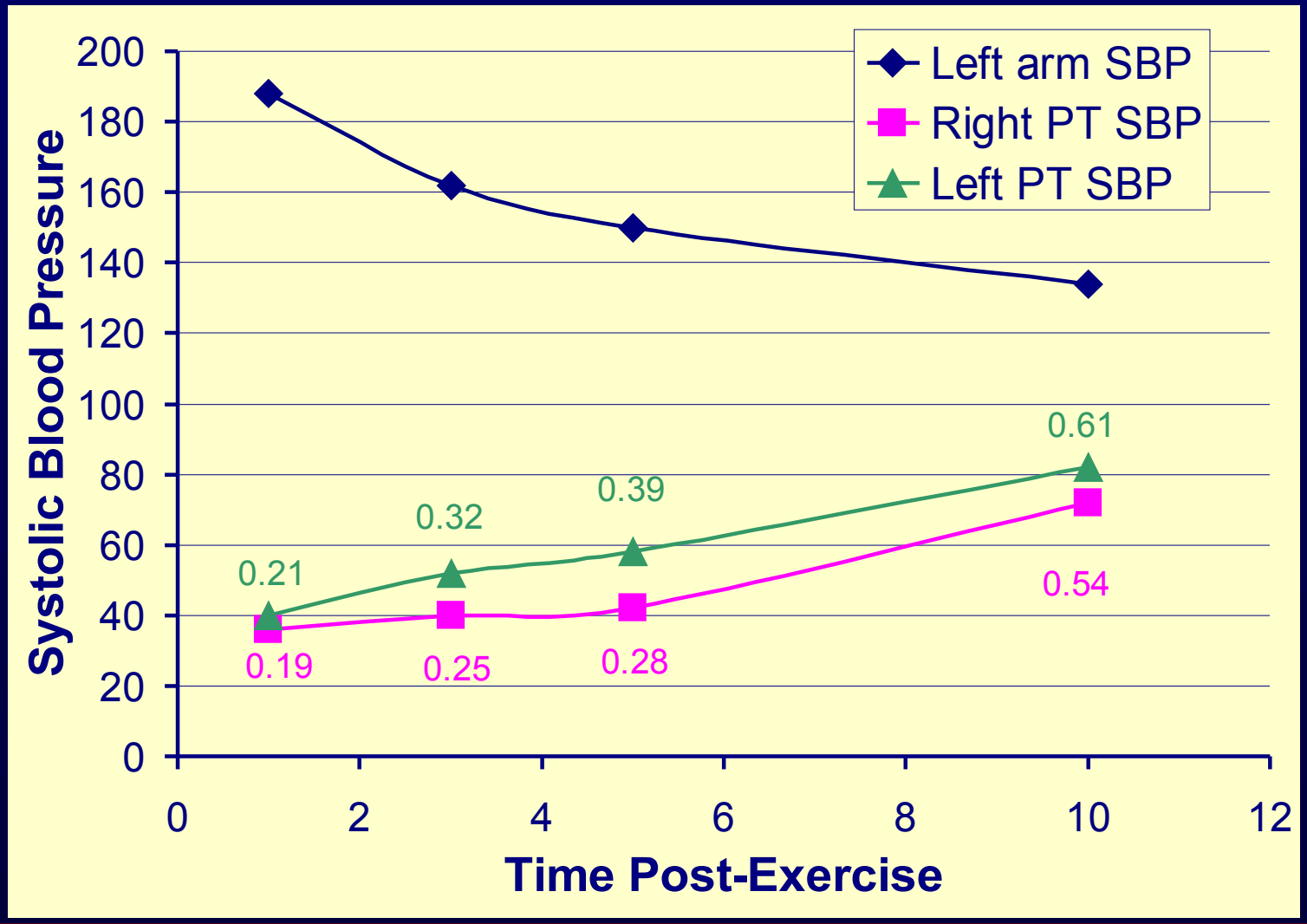


Figure 1. Systolic blood pressures post-exercise and ankle/arm indices for left brachial, right posterior tibial, and left posterior tibial arteries.

Peripheral Artery Disease

- Symptomatic PAD frequently characterized by intermittent claudication, which limits walking distance and interferes with daily activities
- Patients with PAD at high risk for other cardiovascular events including acute MI and stroke (both ~2% per year)
- High mortality = 8.2% per year versus 6.3% per year in post-MI patients

Caro J et al. BMC Cardiovasc Disord 2005;5:14-19

Peripheral Artery Disease

- Progression of PAD related to cigarette smoking, TC/HDL-C ratio, hemoglobin A1c, CRP, and systolic BP

Aboyans V et al. *Circulation* 2006;113:2623-2629

- Risk factor control in PAD patients generally poor in comparison CHD patients
- Statins and beta blockers in particular, but also anti-platelets and ACE-inhibitors, are used less frequently

Bongard V et al. *Euro J Cardiovasc Prev Rehabil* 2004:11:394-402

Table 1. Cardio-protective medication use in ischemic stroke and PAD compared to myocardial infarction patients in 3 French observational studies, 1999-2000.

Drug class	Myocardial Infarction N = 5341	Ischemic Stroke N = 3129	PAD N = 3998
Anti-platelets	82.7%	72.2%	78.7%
Anti-coagulants	11.8%	14.3%	8.5%
Beta blockers	60.0%	22.8%	15.7%
ACE inhibitor or ARB	45.4%	40.9%	38.5%
Statins	61.7%	32.5%	40.4%

Bongard V et al. *Euro J Cardiovasc Prev Rehabil* 2004;11:394-402

Questions

- Does he need revascularization?
- Does this patient fall under the category of secondary prevention of CHD?
- Are his risk factors being adequately managed?
- What lifestyle changes should be recommended?
- What medications would you add?

Actual Plan

- Surgical or percutaneous intervention postponed
- Patient referred to cardiac rehabilitation

Medications Added

- Metoprolol 25 mg daily
- Aspirin 81 mg daily
- Simvastatin 20 mg daily
- Fish oil 1 gram daily
- Nicotine lozenge 2 mg as needed for tobacco craving.

Table 2. Progress in cardiac rehabilitation		
	Pre-rehab	**Post-rehab**
Date	11-1-06	2-14-07
Cigarettes/day	30	2
LDL cholesterol	169 mg/dL	94 mg/dL
Blood pressure	139/84 mmHg	102/70 mmHg
Blood sugar	115 mg/dL	102 mg/dL
Weight	99.5 kg	92.0 kg
Walking distance	0.2 miles	2+ miles

Lipid-lowering therapy increased
Complete cessation of smoking encouraged

Treadmill Test Results

- 8.0 minutes
- Stopped because of general fatigue
- Mild, non-limiting claudication
- HR 82 $\rightarrow$ 139 bpm
- BP 102/72 $\rightarrow$ 190/102 mmHg
- Exercise ECG negative for ischemia
- VO2max = 19.7 mL/kg/min (67%)
- RER = 1.17

Conclusions

- Patients with PAD will likely benefit from exercise training and aggressive risk factor management
- Cardiac rehabilitation is a vehicle which can help to provide such therapy
- Efforts should be made to increase utilization of cardiac rehabilitation for PAD patients
  - Currently not reimbursed

Strategies for Using Cardiac Rehab for Patients with PAD

- Look for co-existing CAD
  - Angina qualifies patient for cardiac rehab
- Inquire about Phase IV cardiac rehab program
  - Self-pay, generally inexpensive
- Lobby CMS for policy change
- Conduct large RCT for benefits of cardiac rehab in PAD patients

- Questions
- Comments