

# Ten-Year Trends in the Incidence and Treatment of Cardiogenic Shock

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# Cardiogenic Shock Complicating Acute Coronary Syndromes

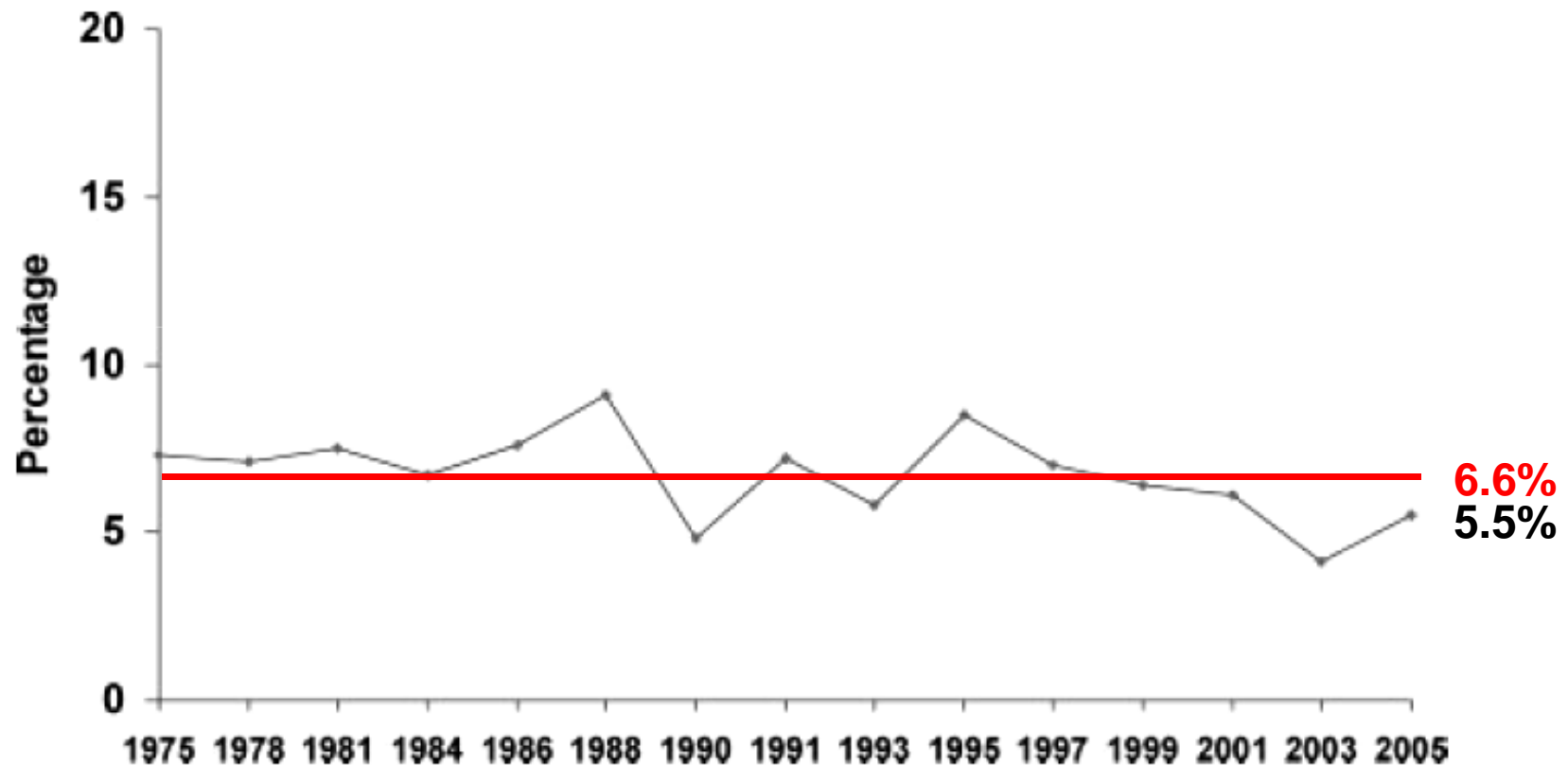
- Incidence 5% to 15% of acute coronary syndromes (ACS)
- Historical mortality rates >80%
- Early revascularization decreases mortality rates
  - SMASH (Urban P et al. Eur Heart J 1999;20:1030-8)
  - SHOCK (Hochman JS et al. N Engl J Med 1999;34:625-34)
  - ACC/AHA guidelines on acute myocardial infarction (Ryan TJ et al. Circulation 1999;100;1016-30)



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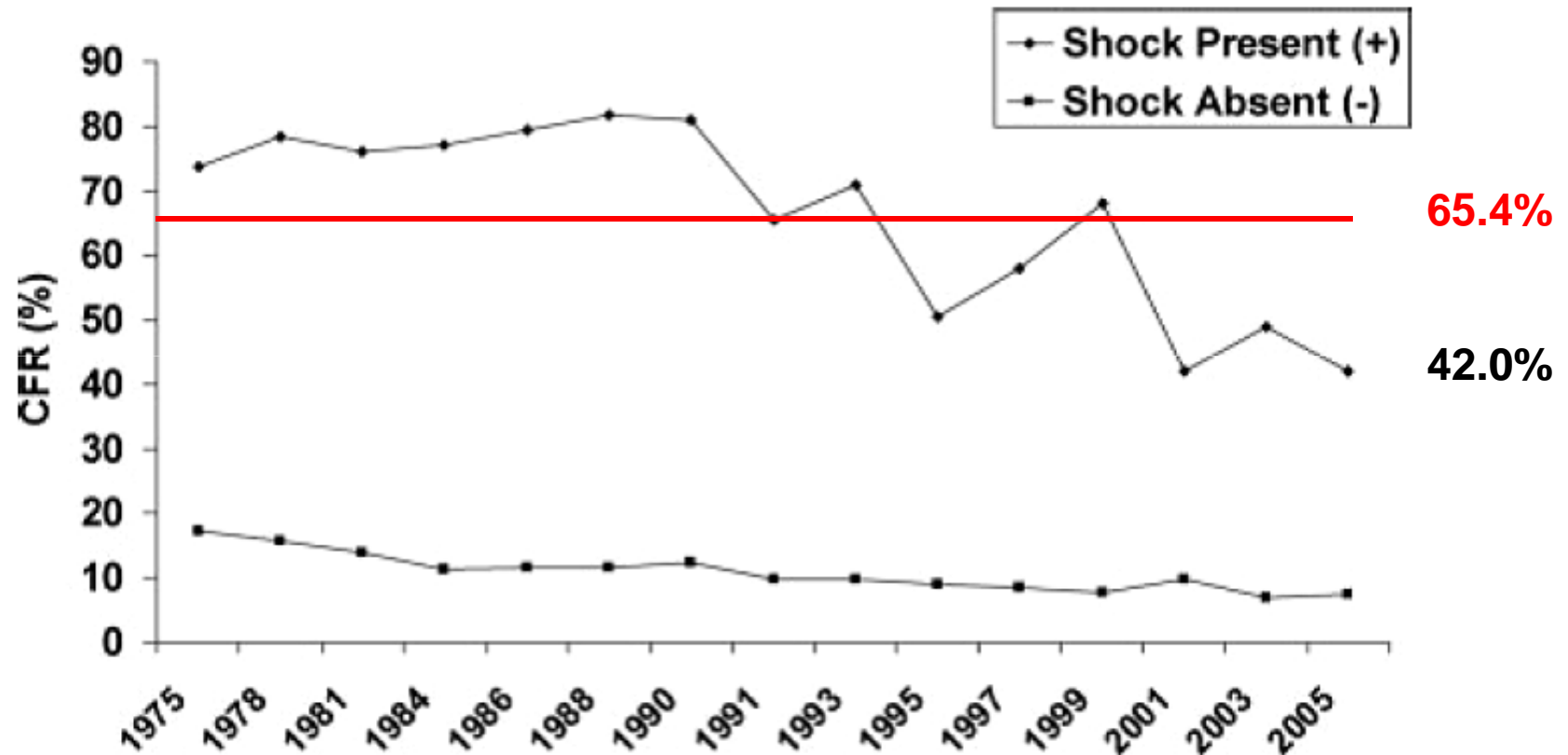
# Temporal Trends in Cardiogenic Shock: Incidence



Goldberg RJ et al. Circulation 2009;119:1211-9



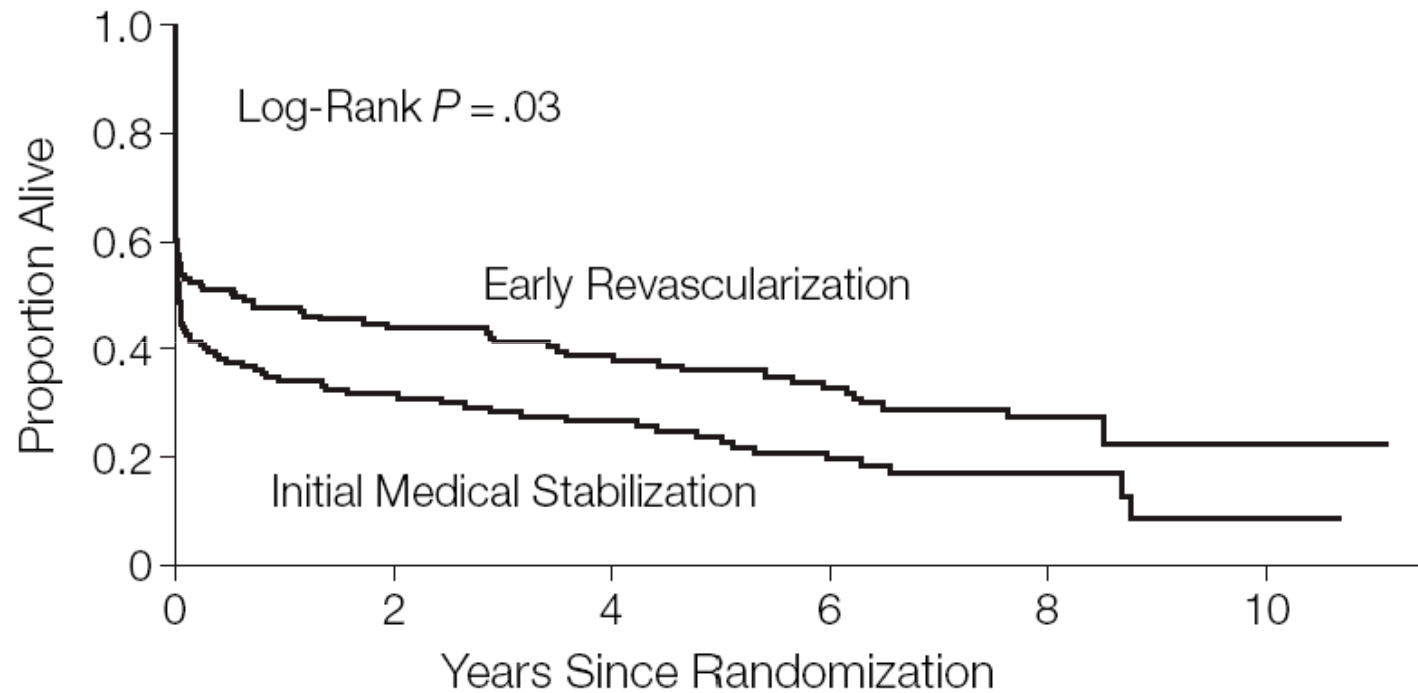
# Temporal Trends in Cardiogenic Shock: Mortality



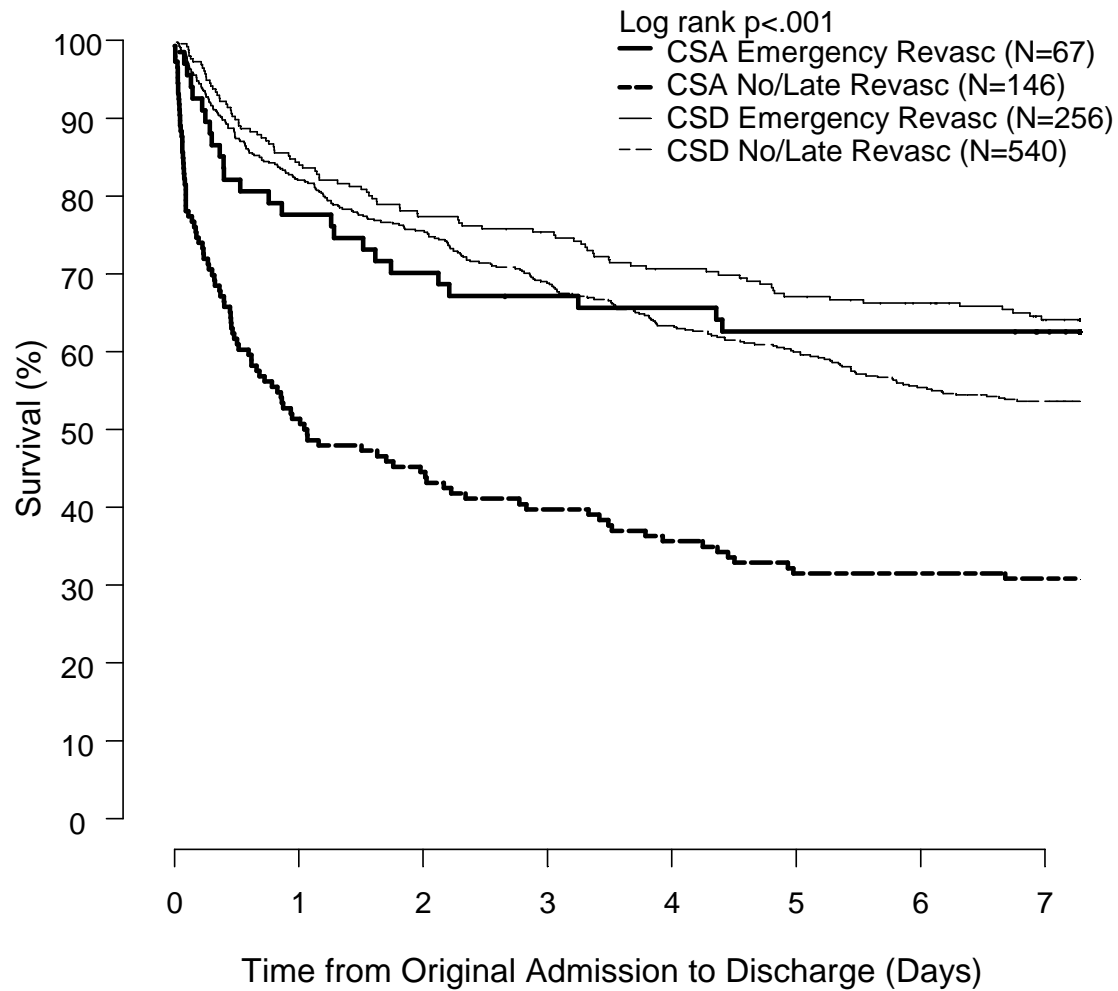
Goldberg RJ et al. Circulation 2009;119:1211-9



# Revascularization in Cardiogenic Shock



# Cardiogenic Shock on Admission



Jeger RV et al. Eur Heart J 2006; 27, 664–670

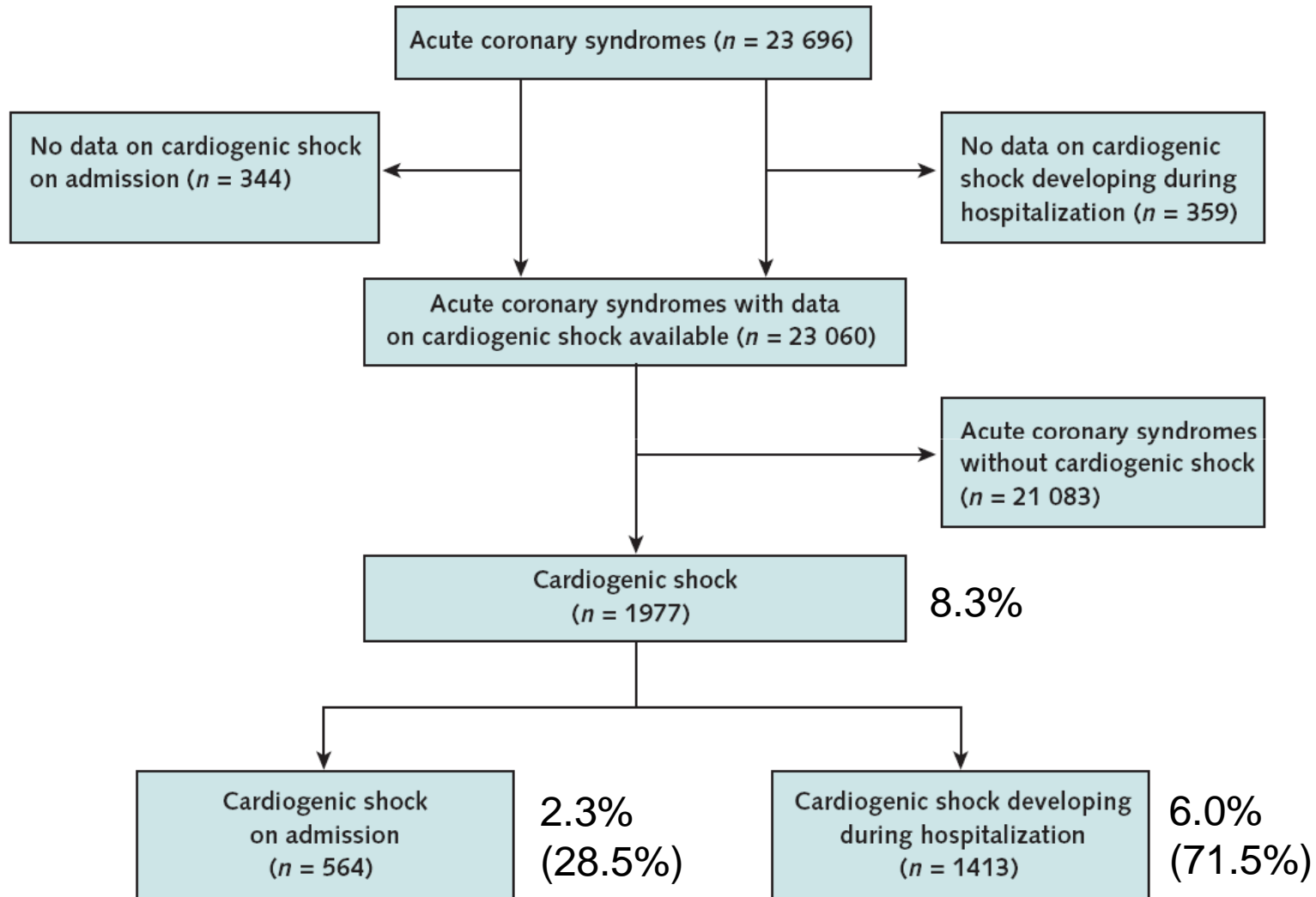


# Acute Myocardial Infarction in Switzerland (AMIS Plus) Registry

- Nationwide registry collecting data on hospital admissions for ACS since 1997
- Participation of 70 out of 106 (66%) acute cardiac care hospitals
- Standardized, internet or paper based questionnaires
- 140 items for each patient including medical history, cardiovascular risk factors, therapeutic management, reperfusion therapy, hospital course, and in-hospital mortality
  - Killip class on admission
  - Cardiogenic shock as an in-hospital complication



# Study Flow Diagram





# Baseline Characteristics

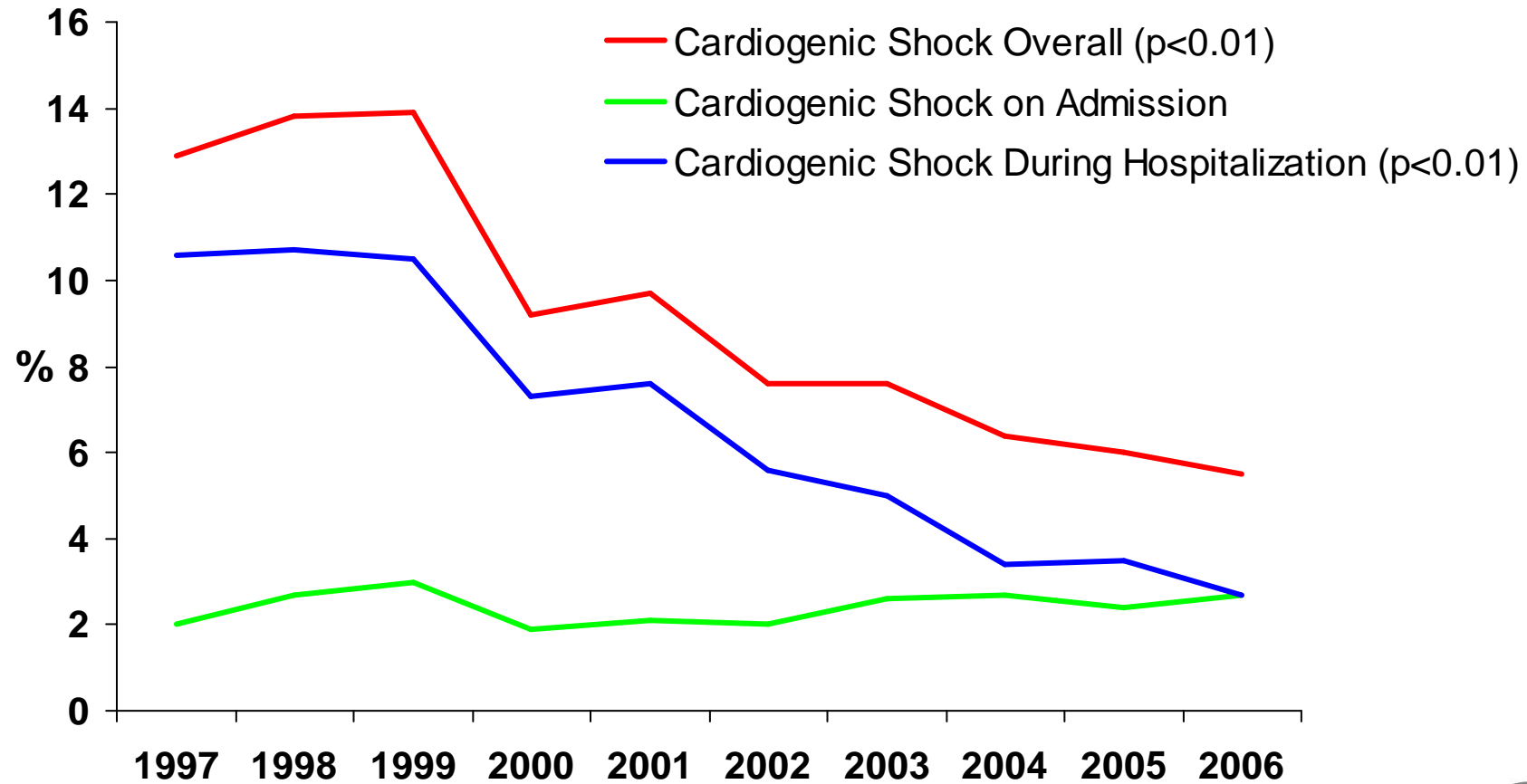
	Total (n=23'696)	CS (n=1'977)	No CS (n=21'083)	p*	CS on admission (n=564)	CS during hospitalization (n=1'413)	p†
Sex (% female)	28	33	27	<0.0001	27	36	<0.0001
Age (y; mean, SD)	66 (13)	70 (12)	65 (13)	<0.0001	67 (13)	71 (12)	<0.0001
History of CAD	39	42	39	0.008	38	44	0.039
Hypertension	56	60	56	0.001	61	60	0.662
Diabetes	20	30	19	<0.0001	32	30	0.302
Dyslipidemia	58	50	41	<0.0001	55	48	0.008
Current smoking	38	37	38	0.006	45	34	<0.0001

\*CS vs. no CS, †CS on admission vs. during hospitalization

CS=cardiogenic shock, SD=standard deviation, CAD=coronary artery disease



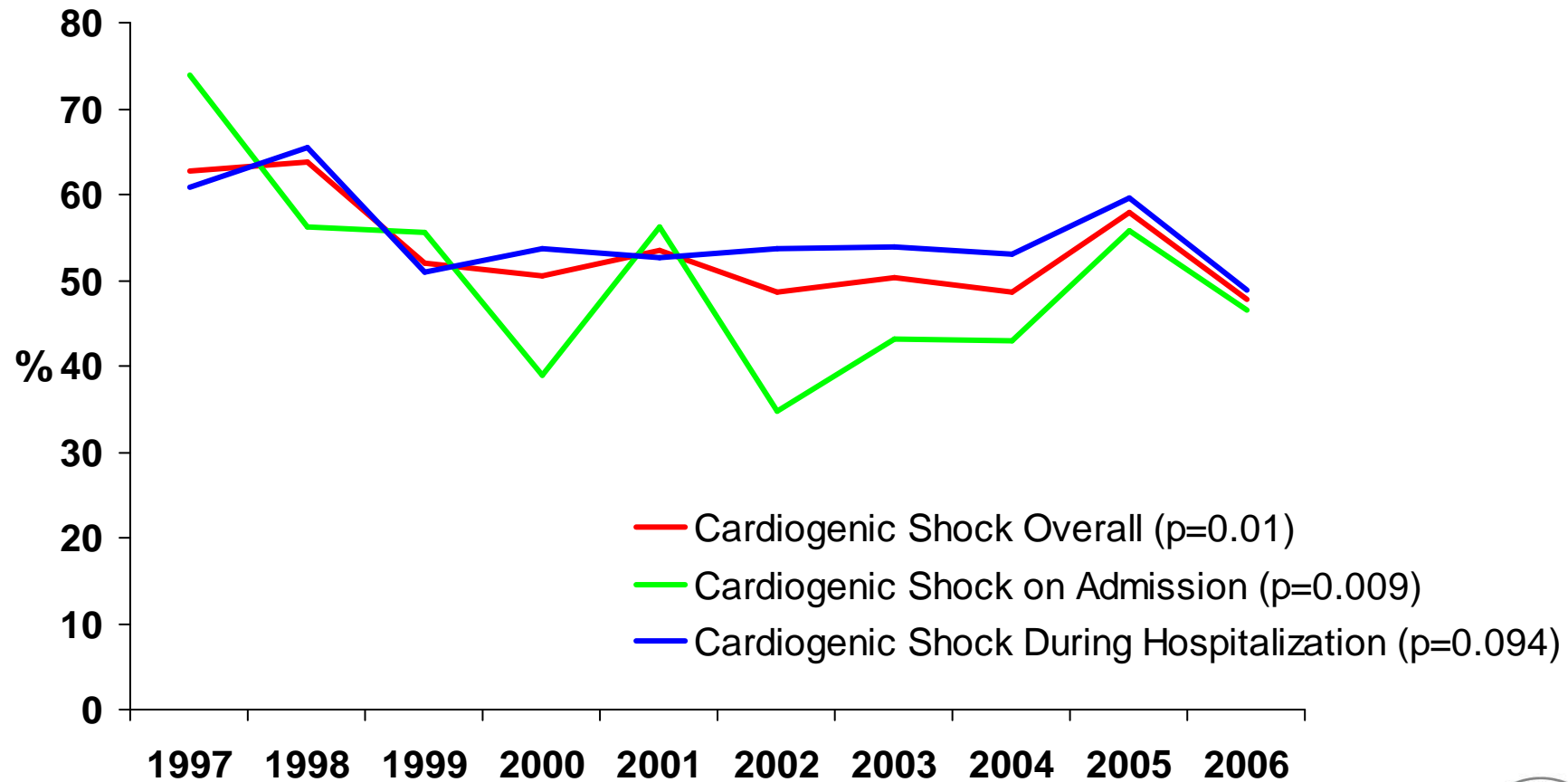
# Incidence of Cardiogenic Shock in ACS Patients



Raban Jeger, Berne 5 March 2009  
Jeger RV et al. Ann Intern Med 2008;149:618-626



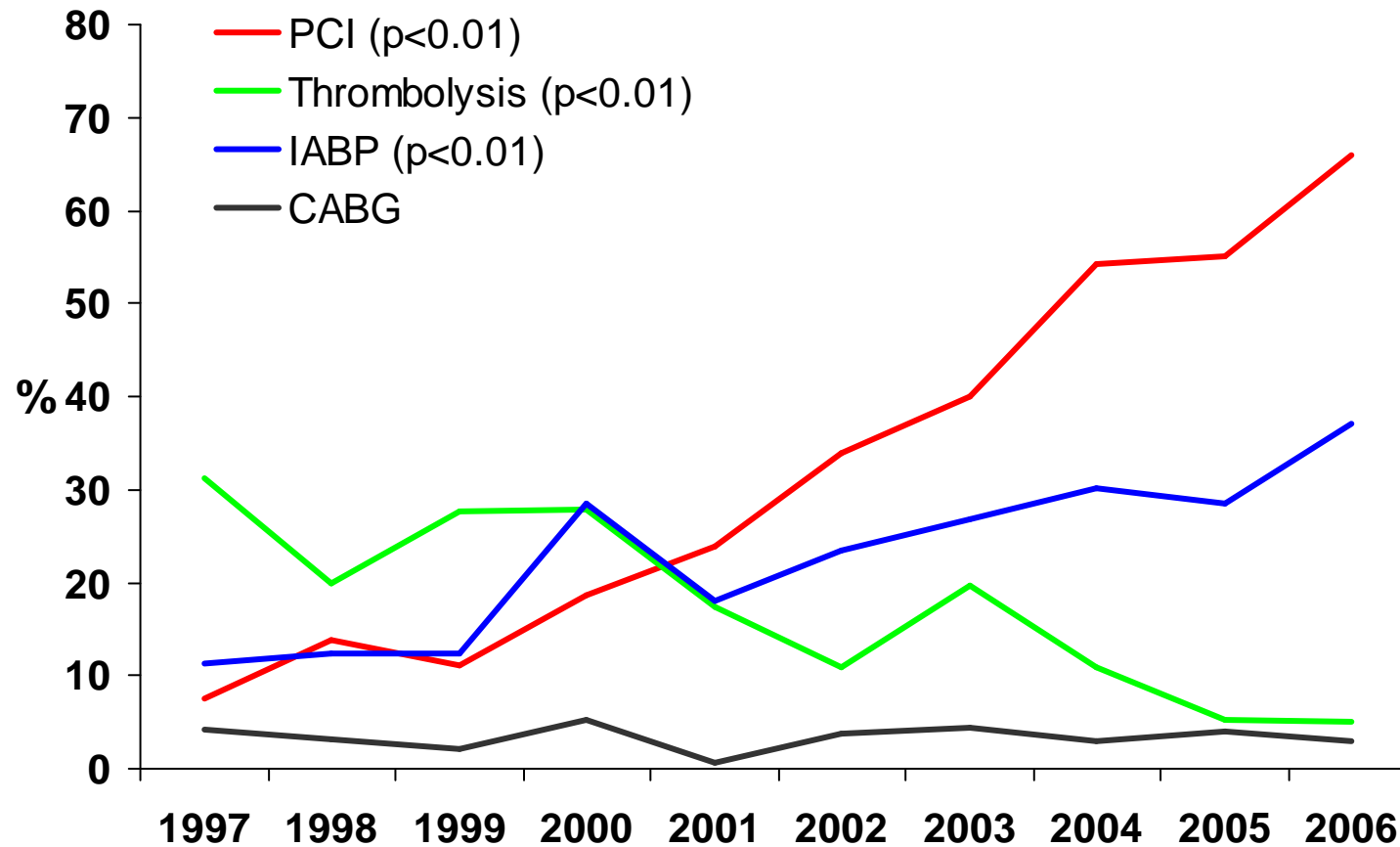
# In-hospital Mortality in Patients with Cardiogenic Shock



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# Therapeutical Management in ACS Patients with Cardiogenic Shock



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# Independent Predictors of In-hospital Mortality in ACS Patients

	Odds Ratio	95% Confidence Interval	p
Intra-aortic counterpulsation	9.25	5.86-14.6	<0.001
Preadmission cardiopulmonary resuscitation	4.61	1.88-11.4	0.001
Killip class on admission			
II vs. I	1.50	1.03-2.17	0.035
III vs. I	2.24	1.34-3.76	0.002
IV vs. I	3.92	1.99-7.72	<0.001
Charlson comorbidity index score			
2 vs. 0	1.82	1.11-2.97	0.017
≥3 vs. 0	1.78	1.07-2.95	0.026
ST-elevation ACS	1.63	1.16-2.29	0.005
History of diabetes	1.45	1.00-2.11	0.048
Age (per year increase)	1.08	1.06-1.11	<0.001
Heart rate (per beat per minute increase)	1.01	1.00-1.02	0.001
Systolic blood pressure (per mmHg increase)	0.99	0.98-0.99	0.002
ACE-inhibitor	0.66	0.47-0.92	0.015
Beta-blocker	0.59	0.42-0.82	0.002
Primary PCI	0.47	0.30-0.73	0.001



# Independent Predictors of Cardiogenic Shock in ACS Patients Without Shock on Admission

	Odds Ratio	95% Confidence Interval	p
Intra-aortic counterpulsation	16.6	11.2-24.6	<0.001
ST-elevation ACS	2.89	1.97-4.22	<0.001
Age (per year increase)	1.03	1.02-1.05	<0.001
Heart rate (per beat per minute increase)	1.02	1.01-1.02	<0.001
Systolic blood pressure (per mmHg increase)	0.99	0.98-1.00	0.002
Primary PCI	0.59	0.39-0.89	0.012
Lipid-lowering drug	0.52	0.37-0.73	<0.001



# Conclusions

- In the decade from 1997 to 2006:
  - Decreasing rates of cardiogenic shock
  - Lower rates of shock developing during hospitalization
  - Unchanged rates of shock on admission
  - Decreasing in-hospital mortality rates (currently <50%)
  - Improvement of therapeutic management



# Conclusions

- Association of improved therapy, specifically increased PCI rates, with
  - Decreased mortality rates in cardiogenic shock
  - Decreased rates of cardiogenic shock developing during hospitalization as a complication of ACS





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*Ann Intern Med.* 2008;149:618-626.

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Thank you for your attention

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