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**AMIS**  
Acute Myocardial  
Infarction  
in Switzerland

# AMIS/AMIS Plus

A testimonial to the changes in the  
management of patients with acute  
myocardial infarction (AMI) in Switzerland

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Cardiology Stadtspital Zürich, Triemli

# 1997 – the birth of AMIS

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## **February 1997**

**Dolly**, the first clone of an adult mammal is presented. Produced by British developmental biologist Ian Wilmut and colleagues of the Roslin Institute in Scotland.



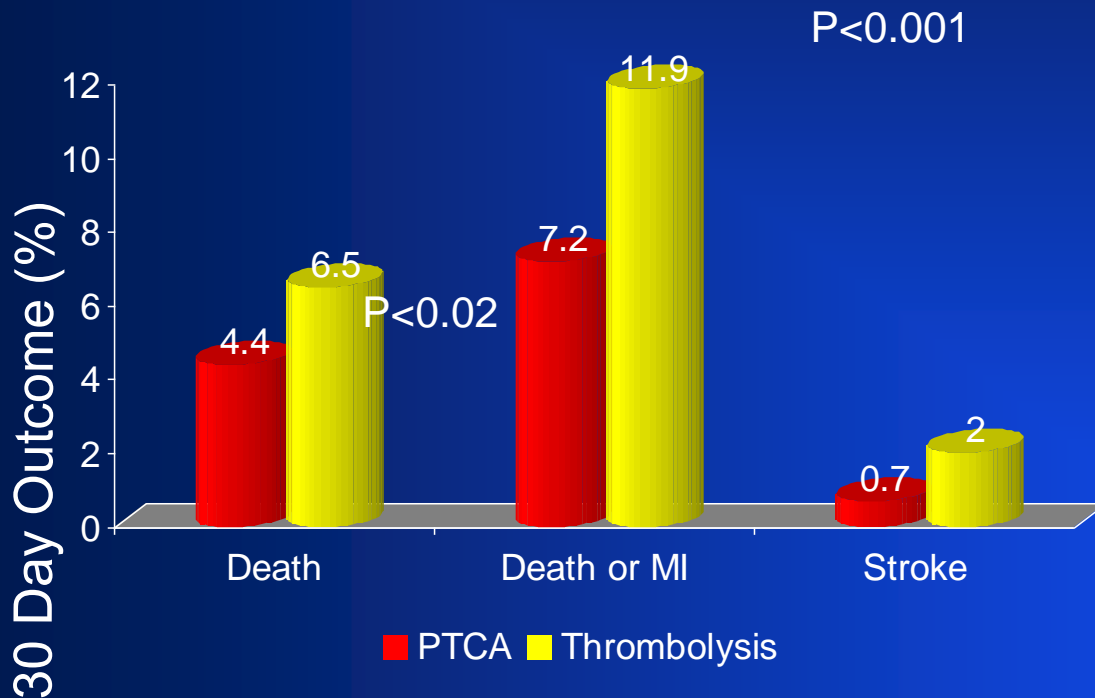
## **November 1997**

**Cindy Grines, MD**, female interventional cardiologist, gives key-note lecture at AHA advocating primary PCI in STEMI - provoking criticism from established male cardiologists.

# Acute Myocardial Infarction

## Thrombolysis vs. Primary Angioplasty: Short-Term Results

Weaver WD et al. JAMA 1997;278:1876



### Meta-Analysis

- N=2606 patients
- 10 randomized trials
- 1985-1996
- 4x: streptokinase vs PTCA
- 3x: tPA (4hr) vs PTCA
- 3x: acc. tPA vs PTCA

# Background on which medical services must be provided

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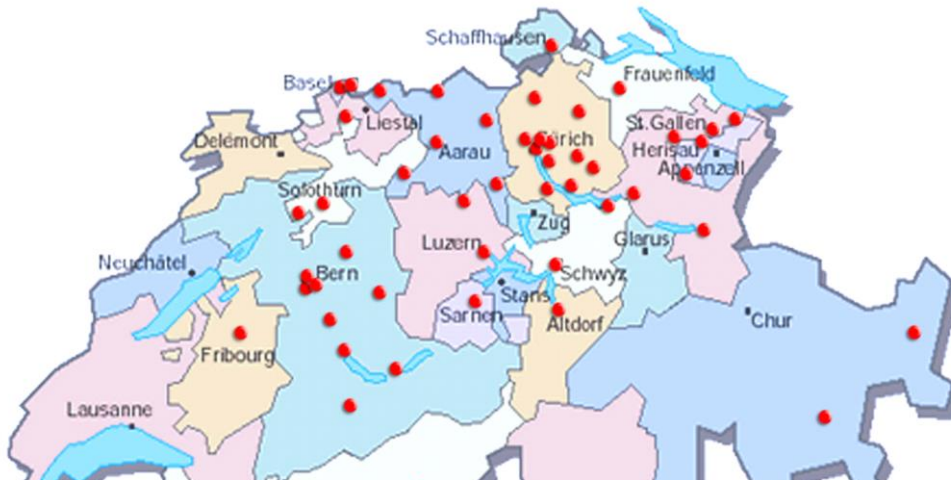
- **Medical-ethical self-perception**
  - The wish and the obligation to provide the best possible, patient-centered therapy.
- **Medical and scientific progression**
  - Large randomized clinical trials (RCT) enable evidence-based medicine.
  - RCT are the base of guidelines.
- **Technical advancement**
  - Fast development of new techniques
    - Diagnostic tools (imaging, biomarkers etc.)
    - Information technology
    - New devices, materials, implants (e.g. stents)
  - Development of new drugs

# AMIS Plus Project

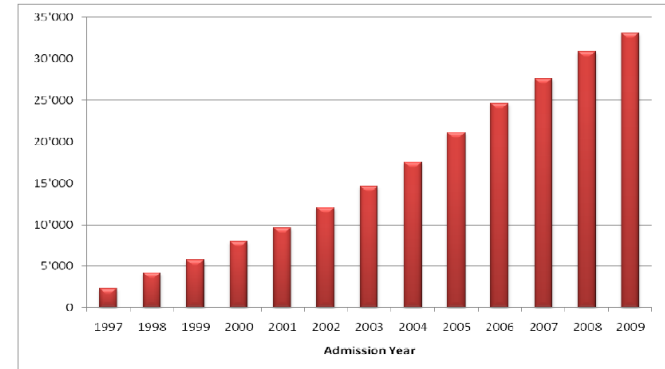
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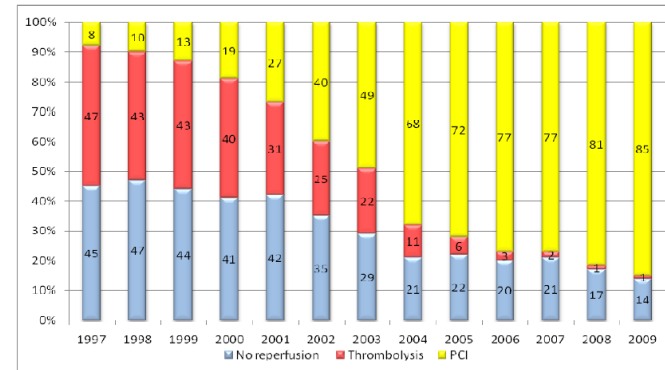
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1. Cumulative number of the ACS patients enrolled in AMIS Plus (n=33'092)



2. Trends in reperfusion therapy in ST-elevation myocardial infarction patients in Switzerland between 1997 and 2009 (n=18'637)



## AMIS Plus Questionnaire

10.2009



**A** Acute  
**M** Myocardial  
**I** Infarction in  
**S** Switzerland

Please do not fill out – for internal use only

Incoming mail/Check	Init.	Entry	Init.	P-Code
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**AMIS DATA ENTRY IDENTIFICATION**

Hospital:

Patient ID number:

VO Set Nr./Code:

Physician ID/ Date of data entry: \_\_\_\_\_ Date: \_\_\_\_\_

**PATIENT AT ADMISSION**

Date of birth: Day   Month   Year

Gender:  Male  Female

Weight (eg.: 68.5 kg is rounded up to     kg):     kg

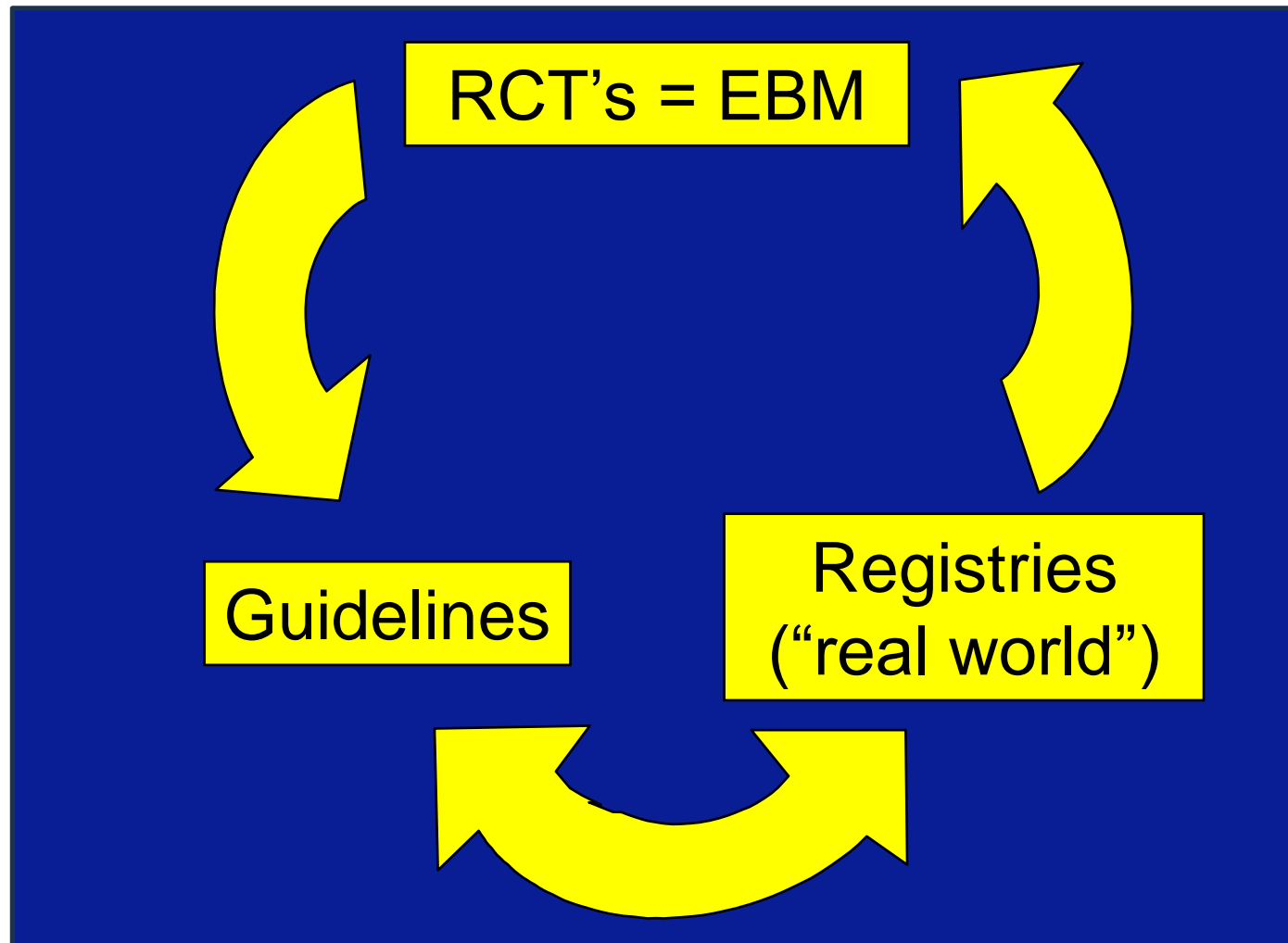
Height:

# Reciprocal Effect of Guidelines, Trials and Registries

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# Aims of AMIS Plus



Collect data and trends on:

- Epidemiology (including risk factors) of patients with acute coronary syndrome
- Diagnostic and therapeutic interventions during hospitalisation
- Compliance with guidelines
- Quality of treatment and outcome during hospitalisation and one year after discharge
- Integration of new diagnostic and therapeutic interventions

...in order to optimise the care of patients with acute coronary syndrome.

# Phases of AMIS

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## 1. Early Phase (1997-2006)

- Establishment of primary PCI, optimal drug treatment

## 2. Consolidation Phase (2007-2016)

- Optimization in the whole of Switzerland
- Quality control

## 3. New challenges and horizons (2017-)

- Broadening and differentiation of
  - Etiology of ACS
  - Quality in treatment



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# AMIS/AMIS Plus Early Phase (1997-2006)

Establishment of primary PCI  
Optimal drug treatment

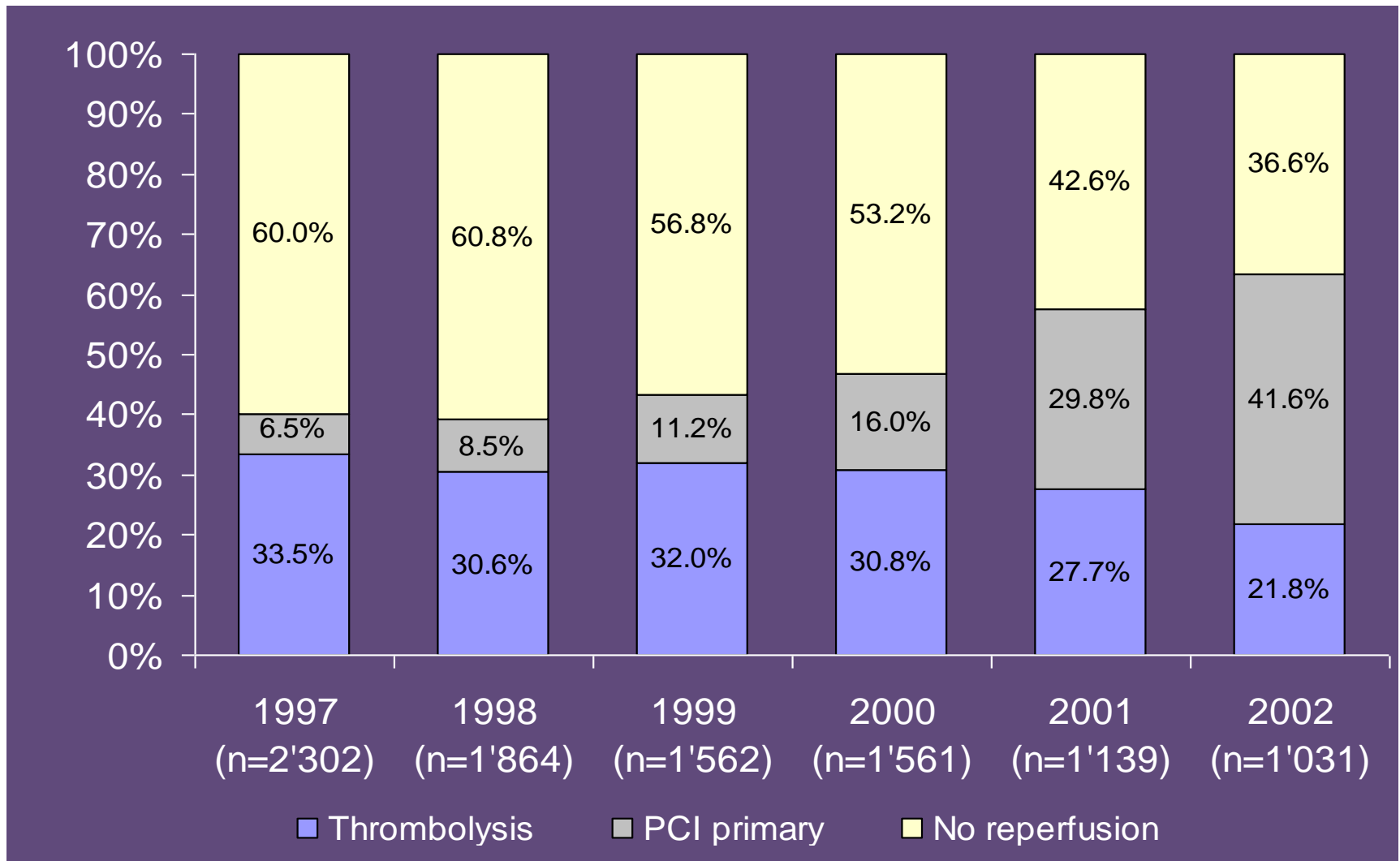
# First Things First!

## Establishment of Primary PCI as STEMI Treatment in Switzerland

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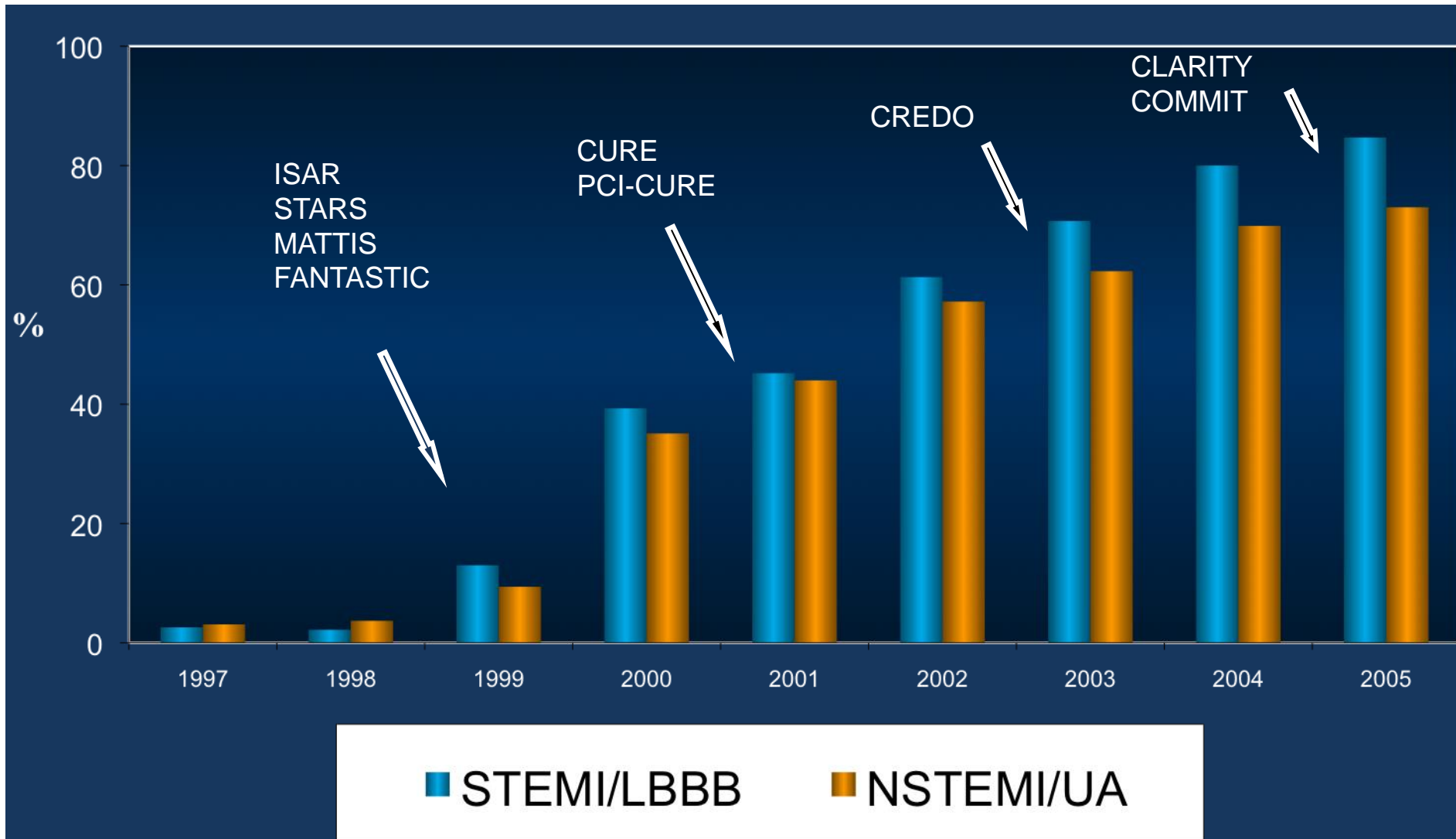


# Impact of RCT on Treatment: Thienopyridines at Discharge

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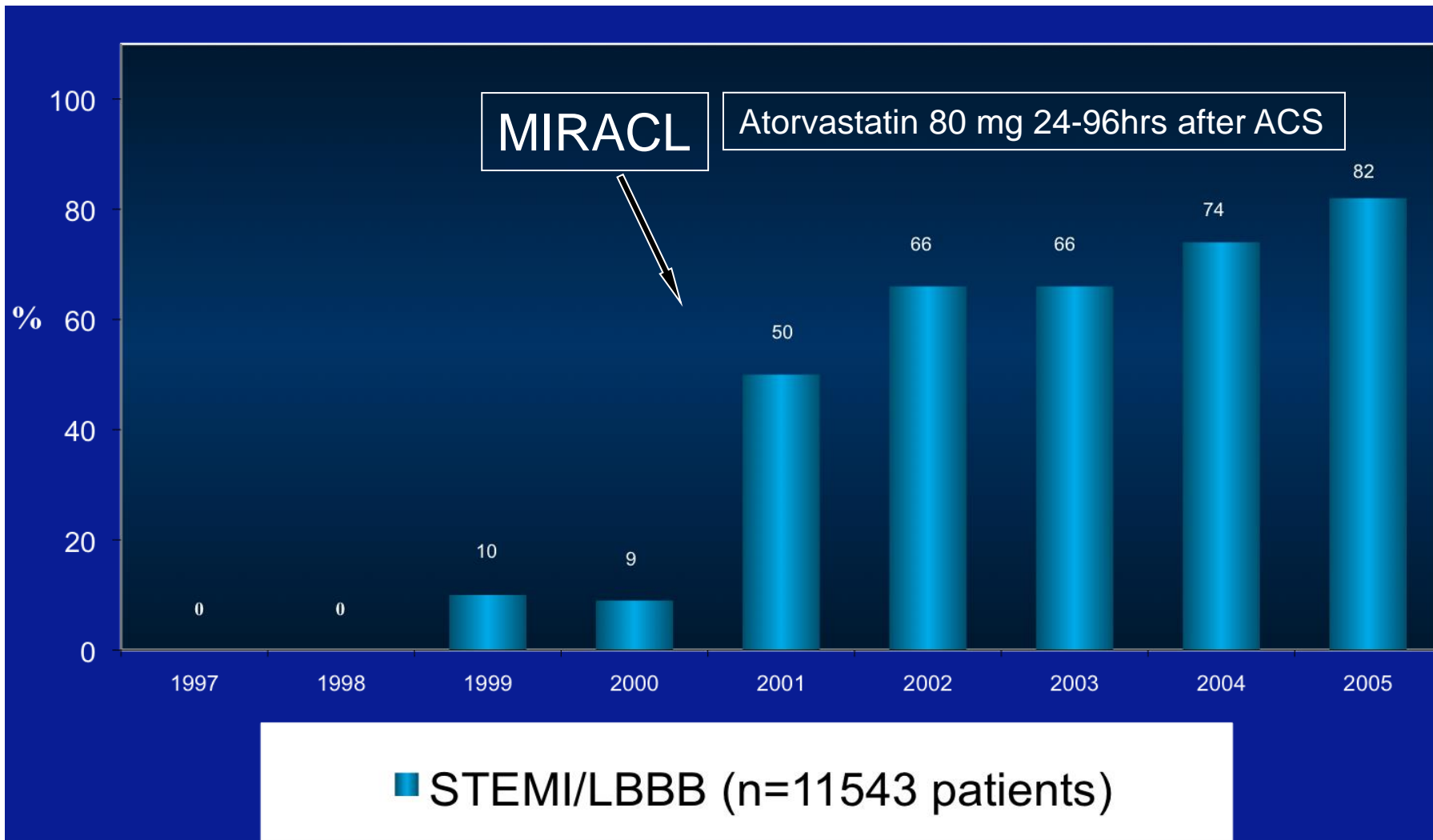


# Impact of RCT on Treatment: Start of Statins During Hospital Stay

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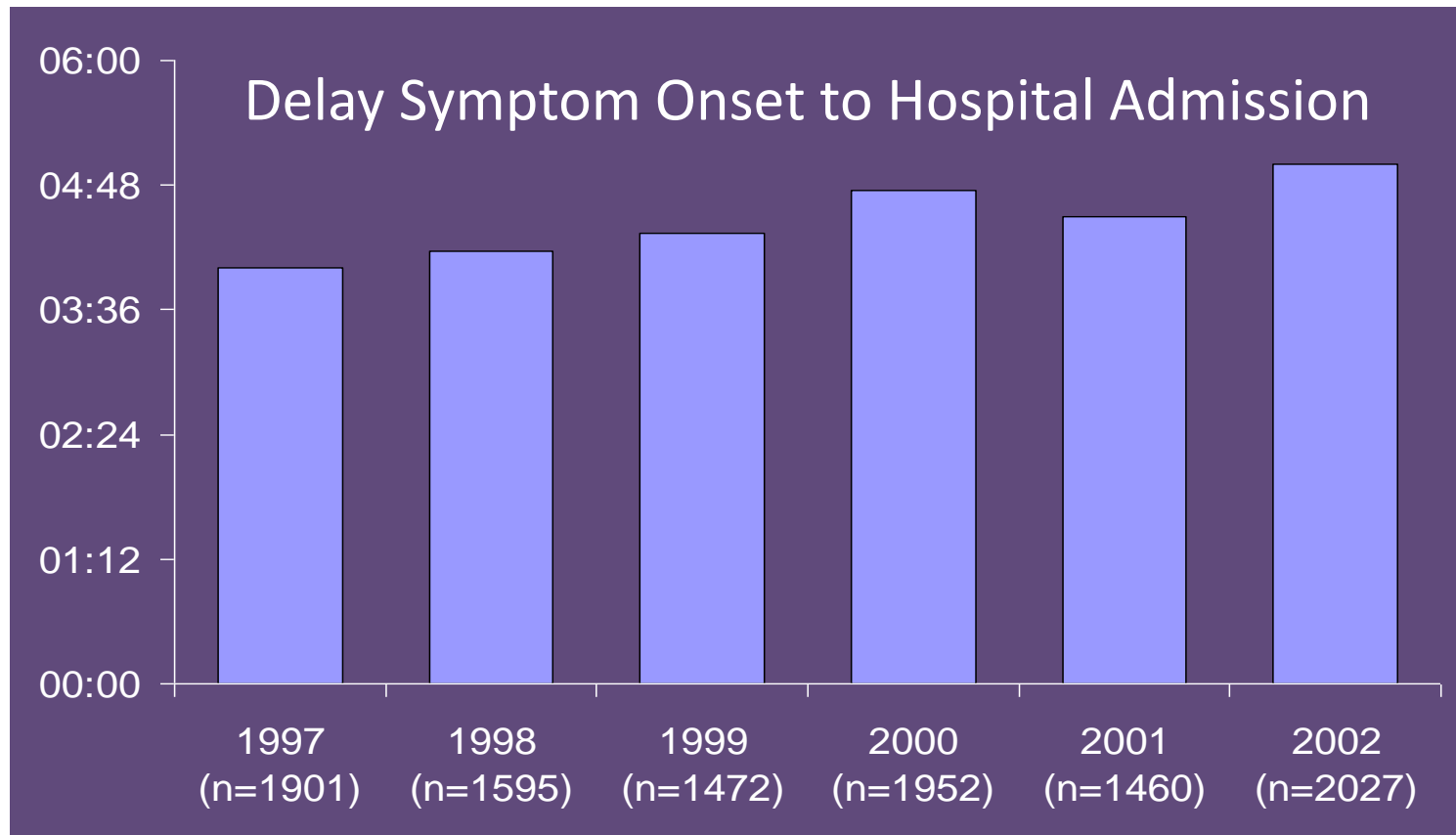


# Lack of Awareness for Symptoms of Myocardial Infarction

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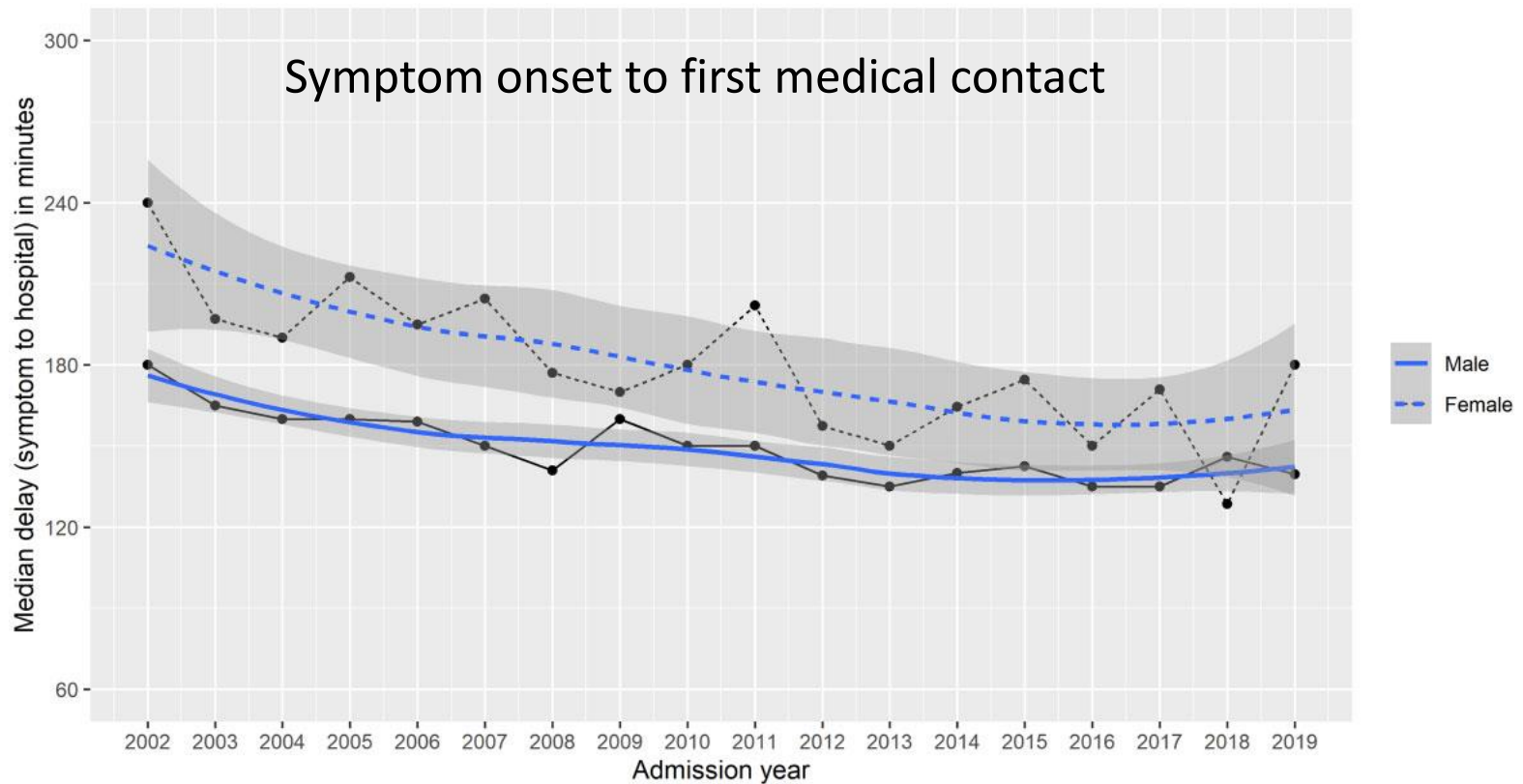
HELP Initiative of Swiss Society of Cardiology and Neurology:  
Goal: Increase Knowledge of myocardial infarction and stroke symptoms

# Reduced Gap in Patient Delay between Women and Men with STEMI

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# AMIS/AMIS Plus

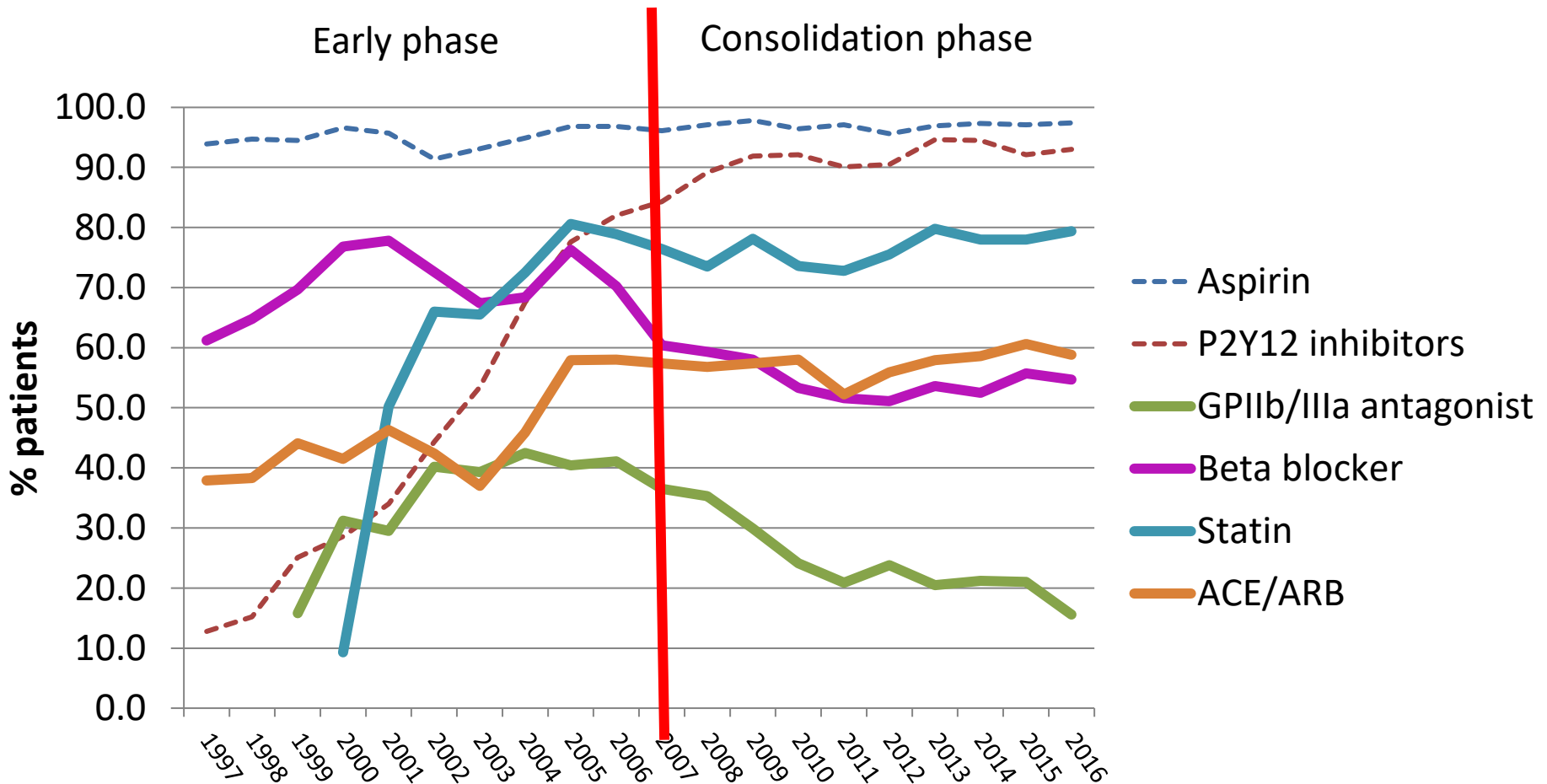
Consolidation Phase 2007-2016

# Trends in immediate drug therapy in STEMI patients (N=31'065)

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P2Y12 – ticlopidine, clopidogrel, prasugrel or ticagrelor  
ACE = angiotensin-converting enzyme inhibitor  
AT = angiotensin receptor antagonist

All  $p < 0.001$  (including ASS)



# 2008: Switzerland is Top in Primary PCI in Europe

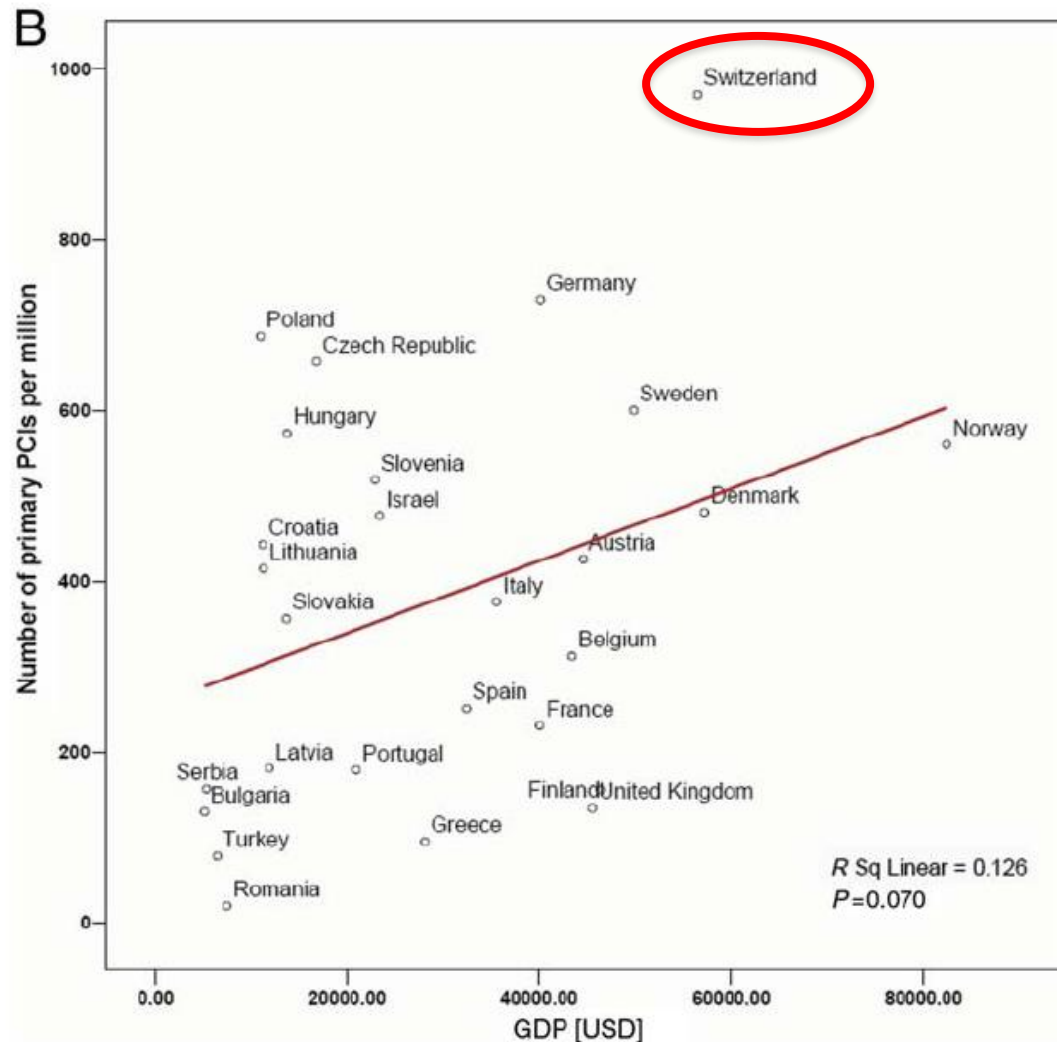
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Number of  
STEMI  
Patients  
Treated with  
Primary PCI

European STEMI  
Registry  
Widimsky P et al.  
Eur Heart J  
2010;31:943-57

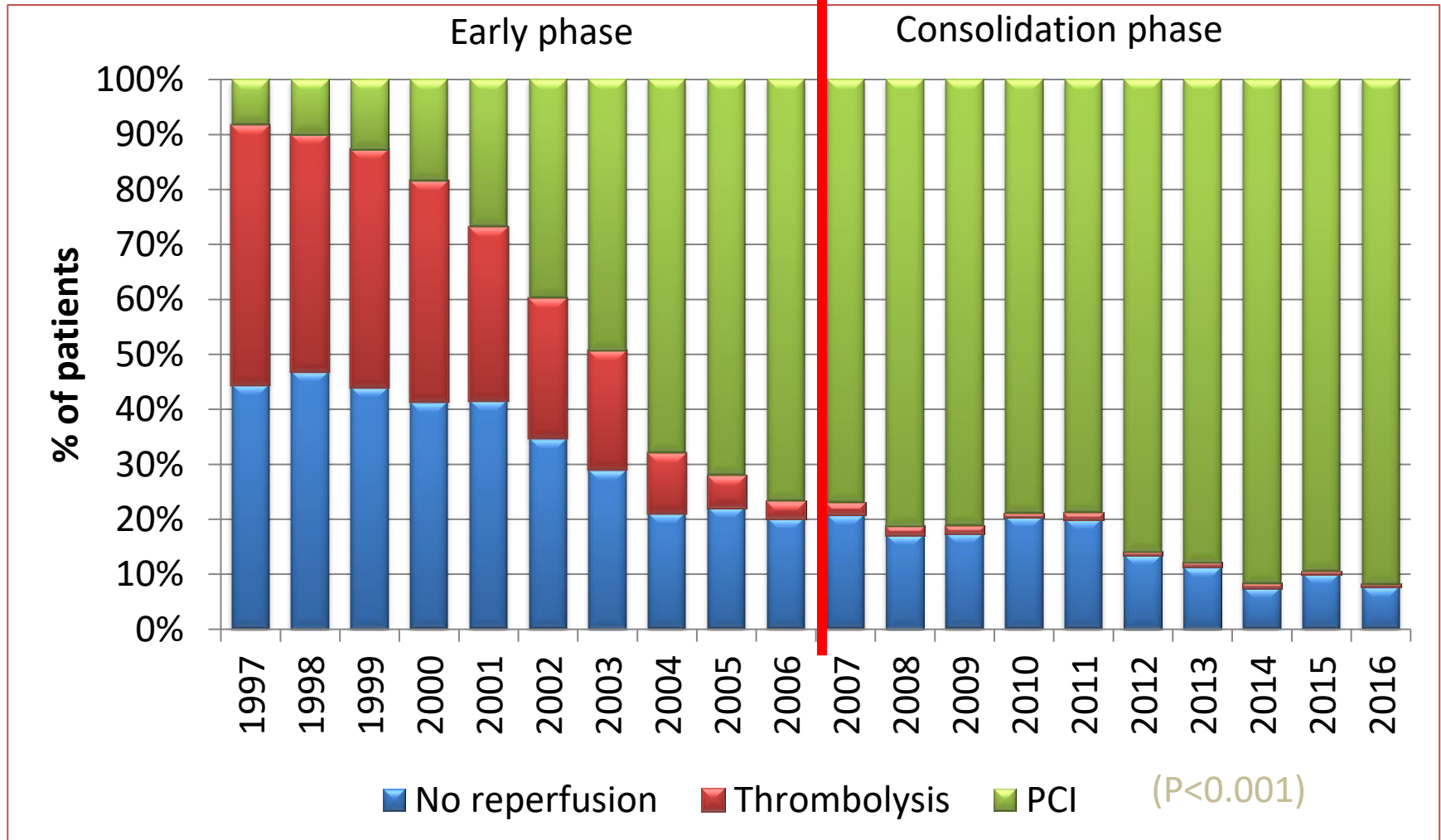


# Reperfusion therapy in STEMI patients (N=31'283)

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# Importance of Quality of Process of Care for Primary PCI

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- As Process-of-care quality indicator the **door-to-balloon time (D2B)** is established.
- Guidelines
- ESC and AHA/ACC:
  - PCI preferred treatment if performed by an experienced team <90 min after first medical contact (Class 1,

# Door-to-Balloon Time Process-of-Care Indicator

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- D2B Time
  - Excellent Process-of-care indicator
    - Optimized patient pathway
    - Patient pathway analysis step-by-step possible
    - Targeted improvements possible
  - Very complex indicator, including many additional factors
  - System indicator:
    - Network characteristics
    - Organization of emergency medical services
    - Quality of care givers (emergency medical service, emergency room, doctors, quality of interventional cardiologist)

# Disease Management AMI Inselspital Bern 1997

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Initiative of Cardiology Department and VISANA Health Insurance

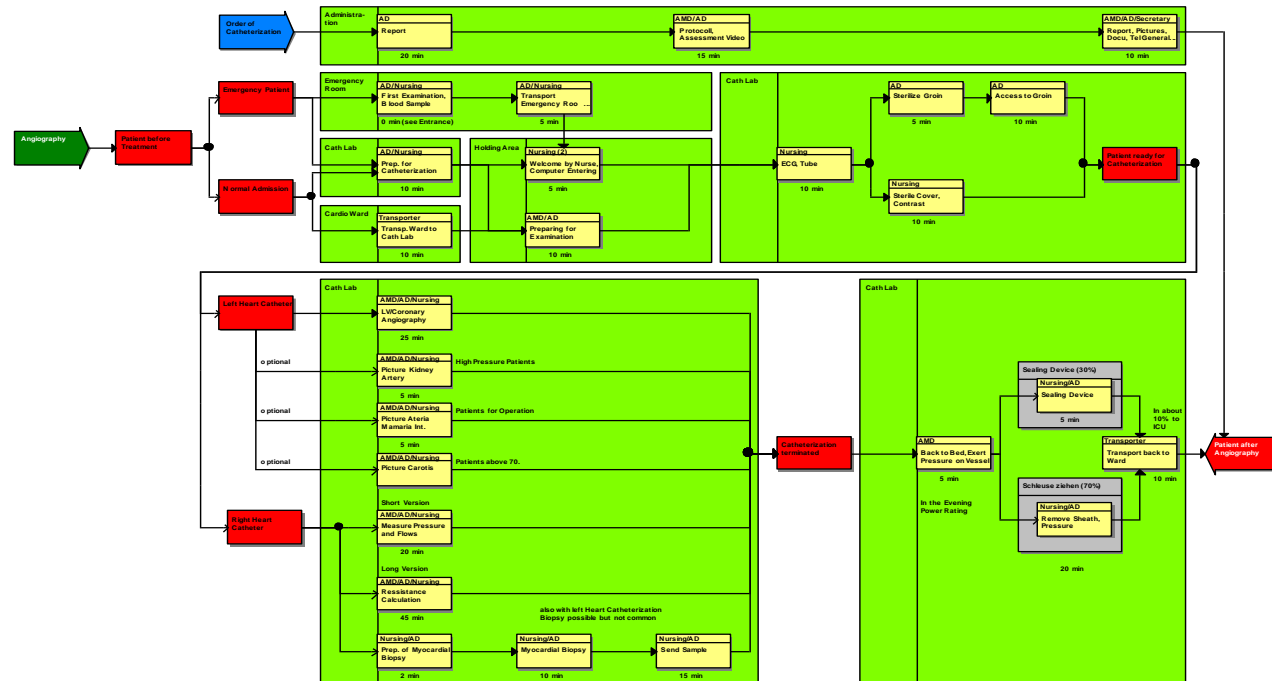
- Participants: Cardiology, ER, ICU, Controlling, Billing, Health Insurance
- Full time fellow: Gabriela Kuster, MD (Fabian Noti: doctoral thesis)

Admission  
Emergency  
Room

Cath Lab

CCU/ICU

Regular Ward



# Quality Improvement Initiatives

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- Door-to-balloon Alliance (ACC 2008):

(JACC Cardiovasc Interv 2008;1:97-104)

**PCI <90 min in 75% or more of patients**

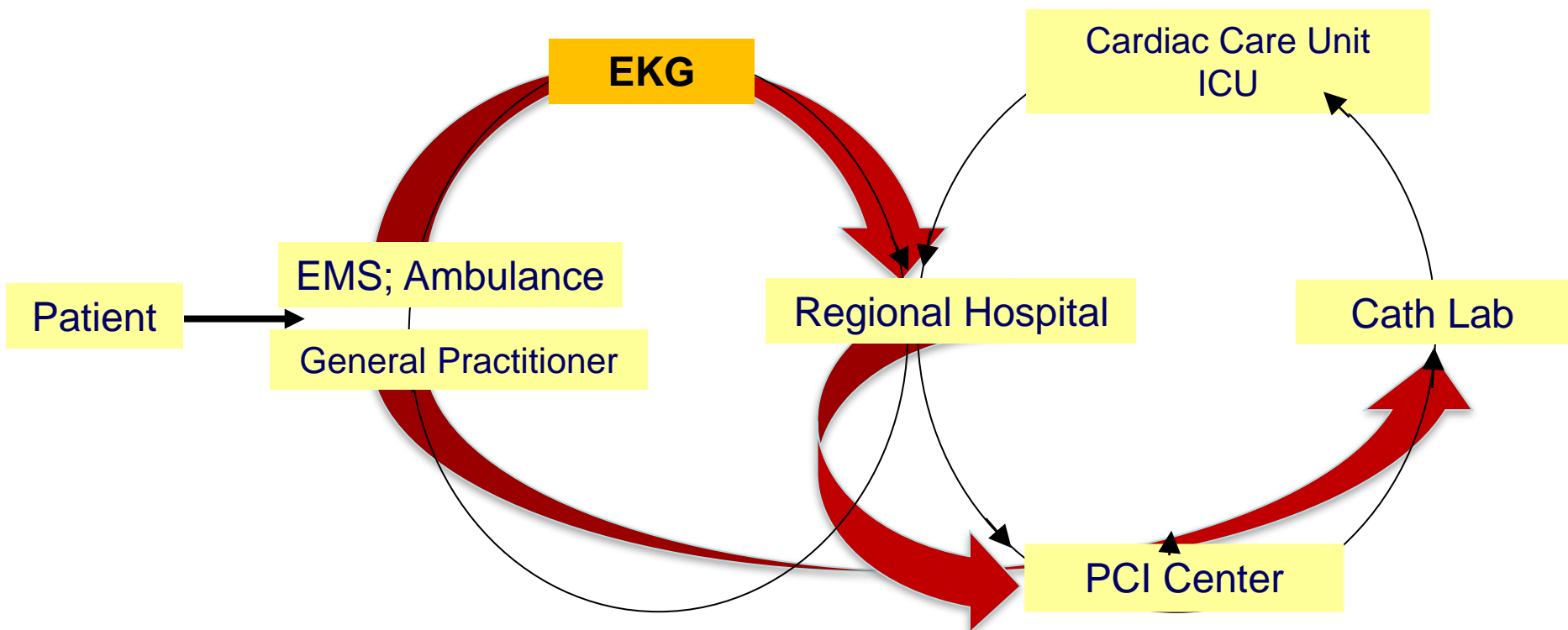
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Prerequisite for timely reperfusion of STEMI by PCI is a well functioning STEMI network

Evolving changes in the emergency chain for the treatment of myocardial infarction



# Switzerland fulfills the goals of the D2B Initiative

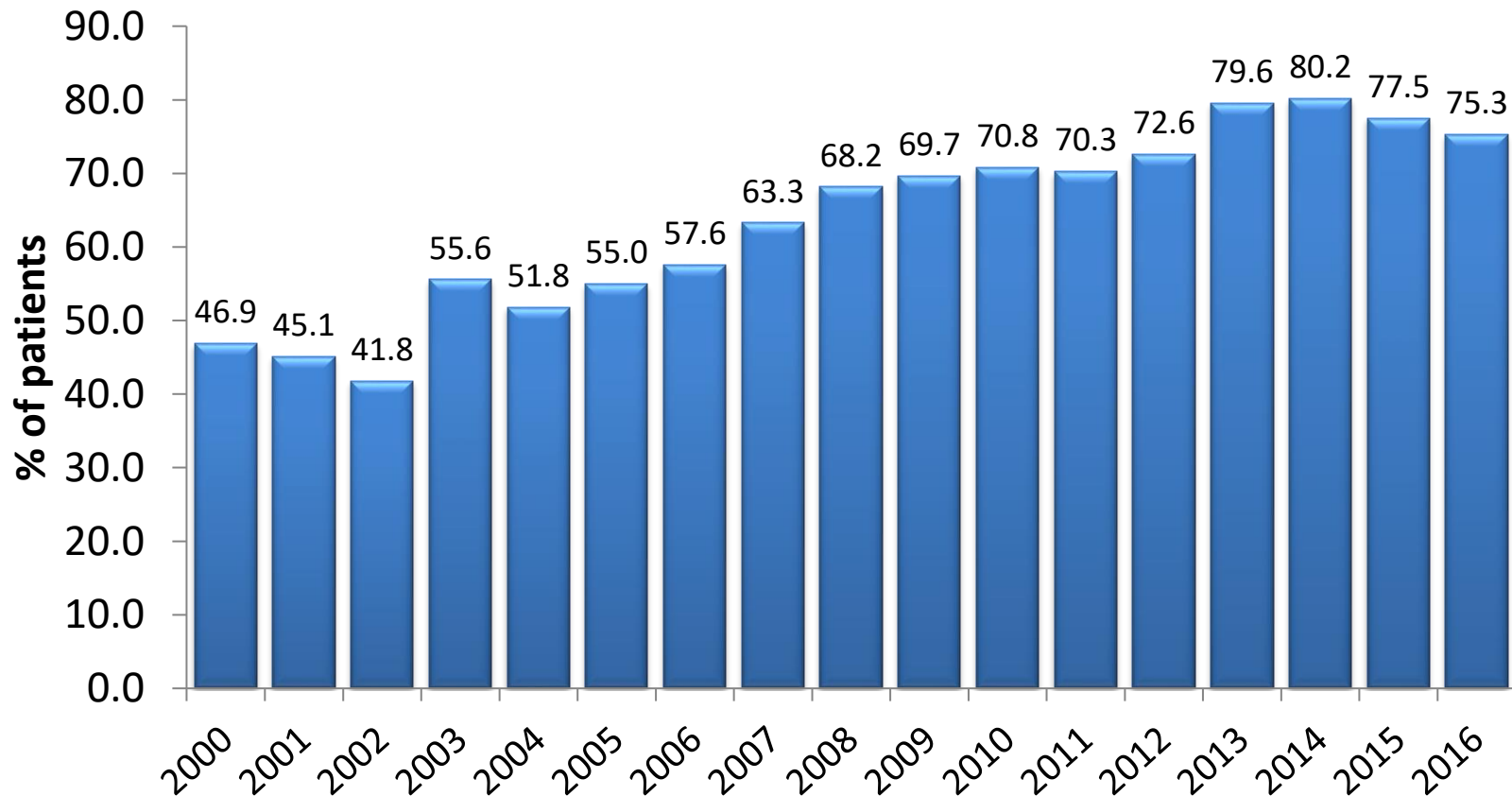


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Door-to-balloon time <90 min (STEMI patients + PCI)



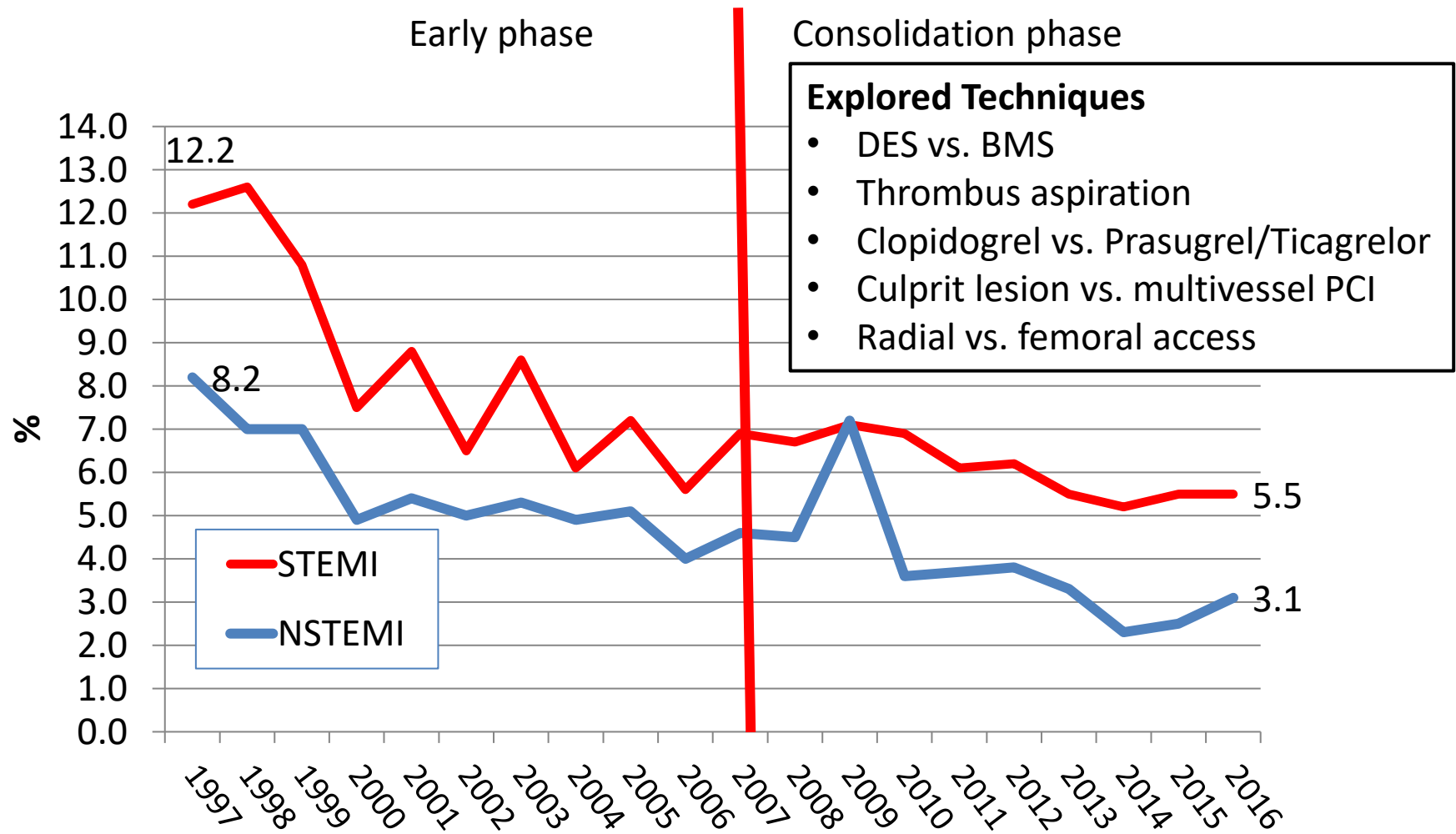


# Crude in-hospital mortality of ACS patients (n=55'627)

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reduced by 5% per year (OR 0.95; 95%CI 0.94-0.96; P<0.001)

# Lara Gut

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Man kann gut sein, aber man kann sich immer verbessern: Lara Gut. (Lake Louise, 7.12.2014)

Even if you are Gut,  
you always can  
become better!!

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# AMIS/AMIS Plus

## New challenges and horizons (2017-)

Broadening and differentiation of  
Etiology of ACS  
Quality of treatment

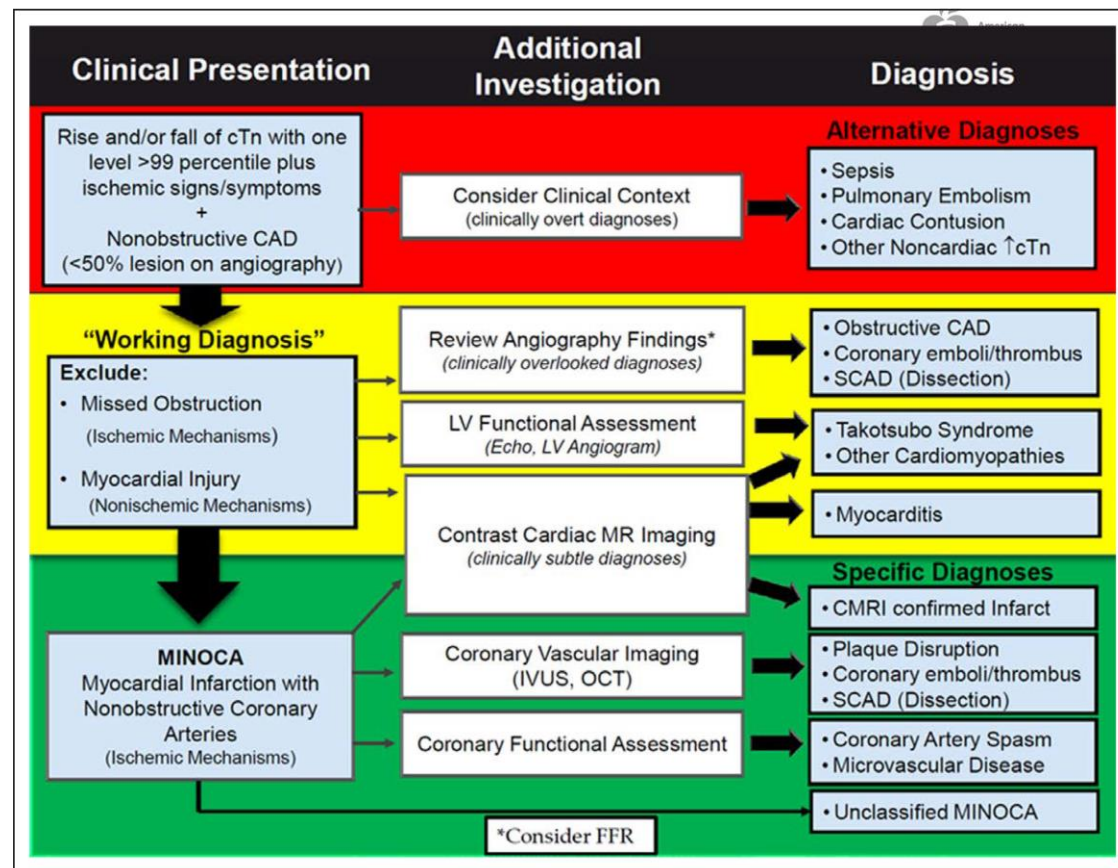
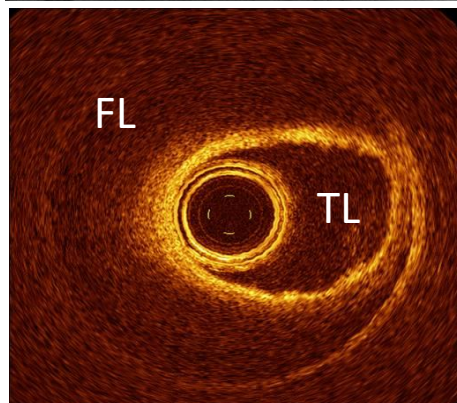
# MINOCA = Myocardial Infarction with Non-obstructive Coronary Arteries

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Spontaneous  
coronary dissection



TL: True Lumen FL: False Lumen

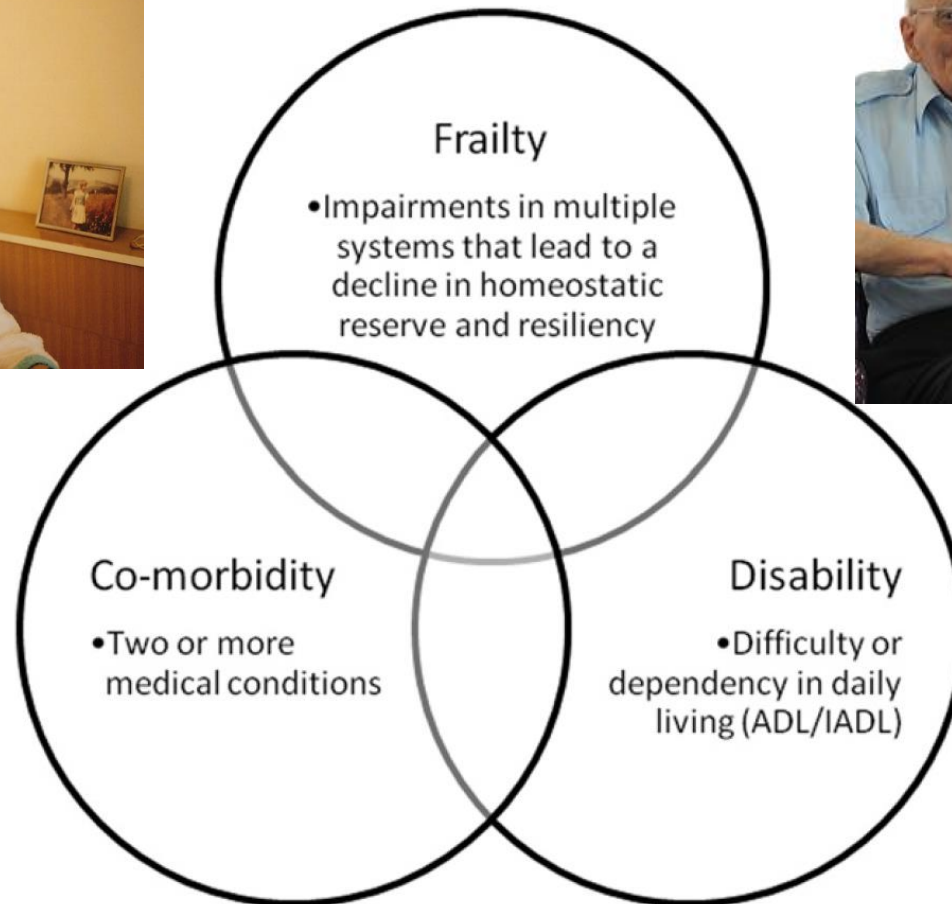
Circulation 2019;139:00

# Elderly Frail Patient!

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# Elderly Patients: What is the appropriate use of PCI in ACS and primary PCI in STEMI?

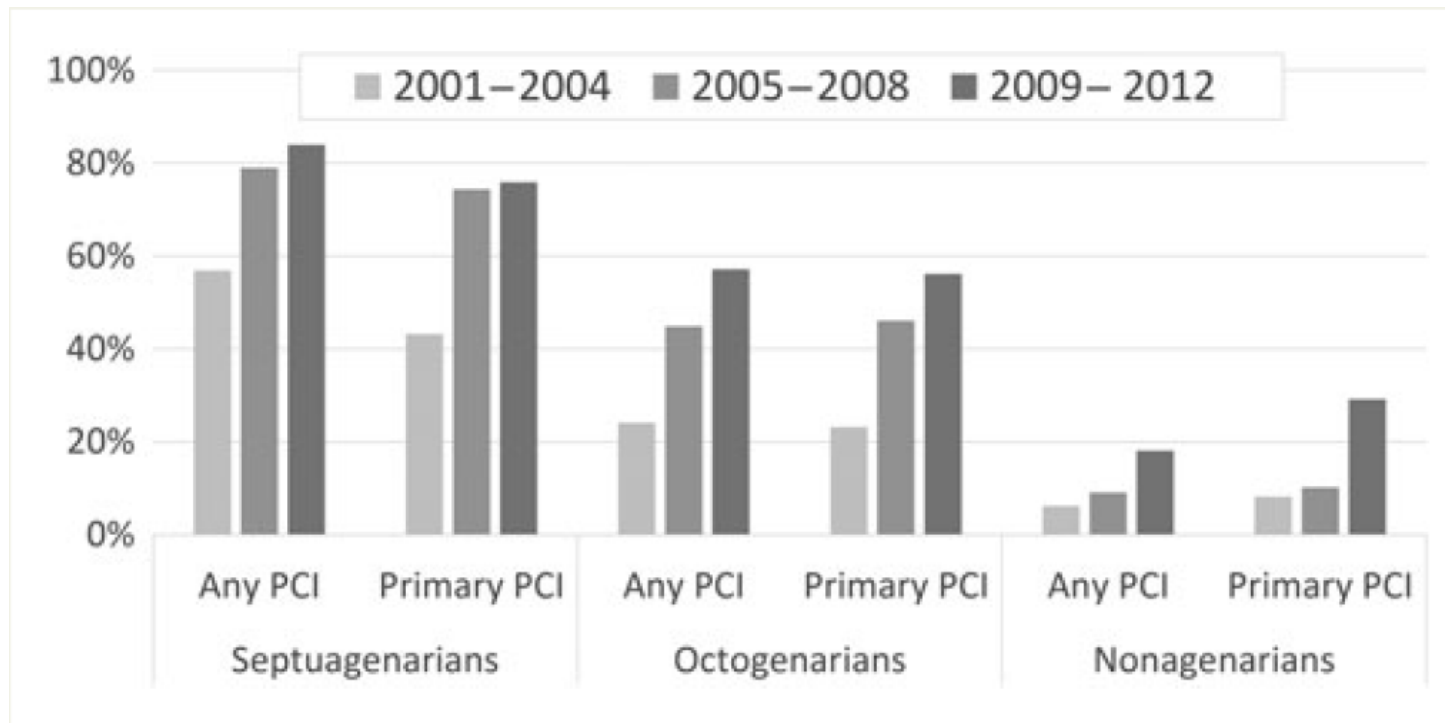
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Data from AMIS:

- Increasing use of revascularization by PCI in elderly patients over time
- However, low rate in octogenarians and nonagenarians



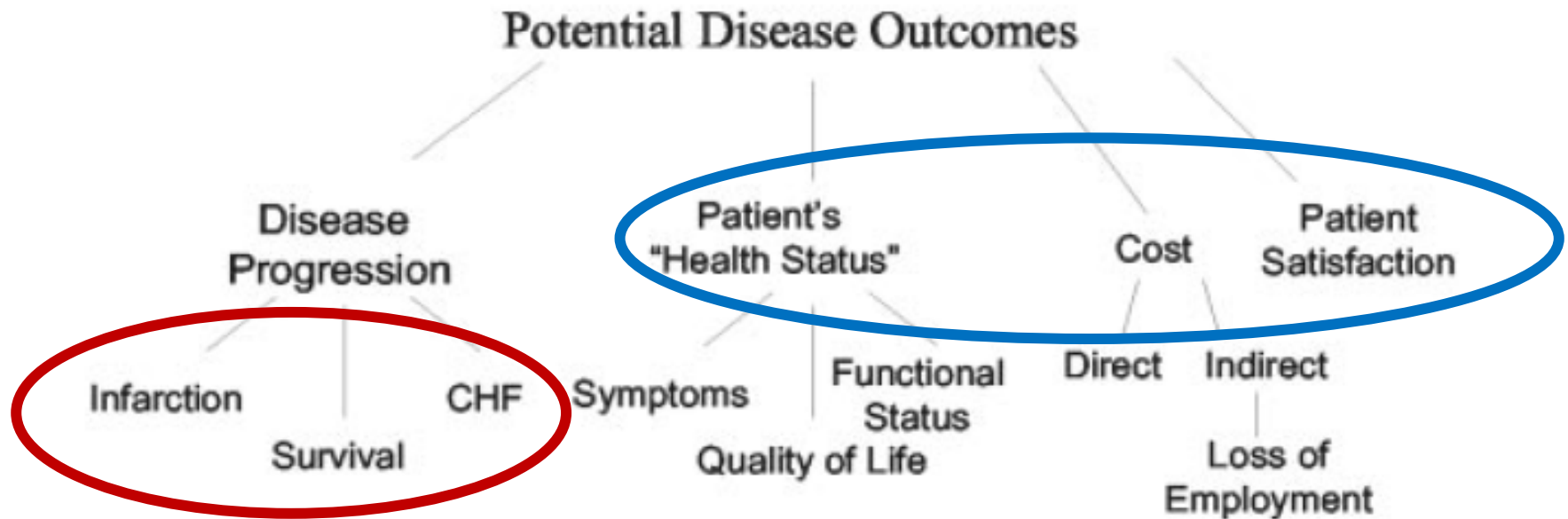
# Assessment of Quality of Care in a Comprehensive Way

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- Clinical Reported Outcome Measures (CROM)
- Patient Reported Experience Measures (CREM)
- Patient Reported Outcome Measures (CROM)
- Costs



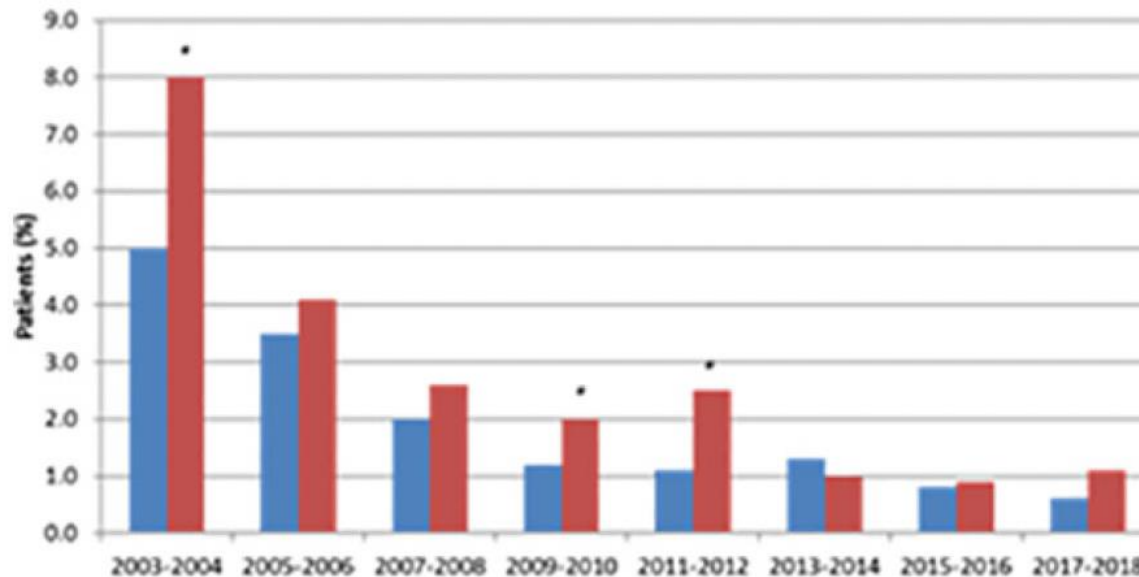
# Example of Patient Reported Outcome Measure (PROM)

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## A. Recurrent angina





# Cost estimates for percutaneous revascularization of ACS in CH

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## Percutaneous Coronary Intervention in Switzerland 2020



CA

**53'088**  
coronary angiographies



TRANSRADIAL

**65%**  
transradial access



PCI

**25'933**  
percutaneous coronary interventions  
48.8% of all coronary angiographies



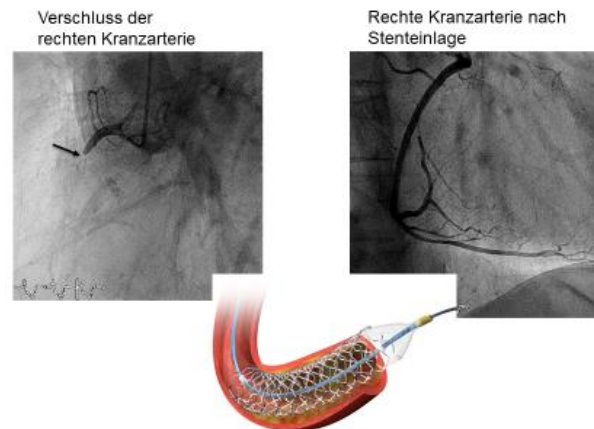
SETTING

**39%**  
Emergency PCIs



OUTCOME

**1.36%**  
overall in-hospital mortality after PCI  
0.08% elective | 1.6% in NSTEMI-ACS | 4.1% in STEMI | 42% in shock



**Prize Stent: 500 CHF**

On average 2 stents per intervention

$2 \times 25933 \times 500 = 25,9 \text{ Mio/year}$

**Costs DRG:**

All PCI:  $25'933 \times 13'580 = 352,2 \text{ Mio CHF}$

**ACS: 39% of 25'933 = 10'114 Patients**

**Costs for invasive treatment of ACS: 137,3 Mio CHF**

NB: Costs for lipid lowering therapy in CH 2014: 227Mio CHF\*

# 25 Years of AMIS Plus: What is it worth?

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- The AMIS Plus Registry was part and parcel of the successful introduction of a primary PCI in Switzerland.
- AMIS contributed through benchmarking to improvements in process-of-care and quality control in many hospitals.
- Verifies whether RCT results are translatable into routine clinical practice.
- Provides the opportunity to explore the best treatment for ACS of new etiologies and in subgroup of patients.
- Has the potential for expanding quality measure to patient reported outcomes and experience.
- Encourages the use of evidence-based acute cardiac care with the goal of improving patient outcome.