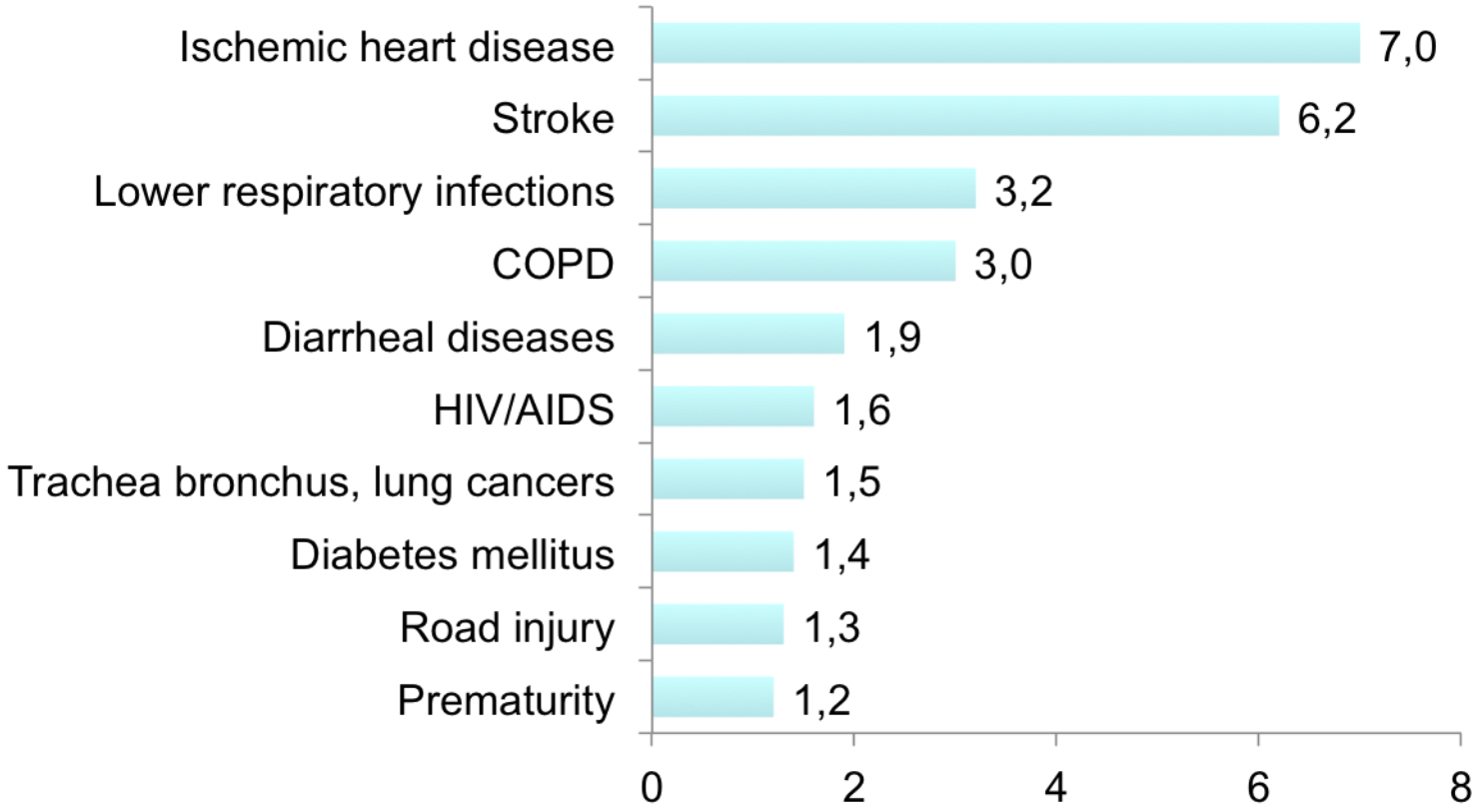
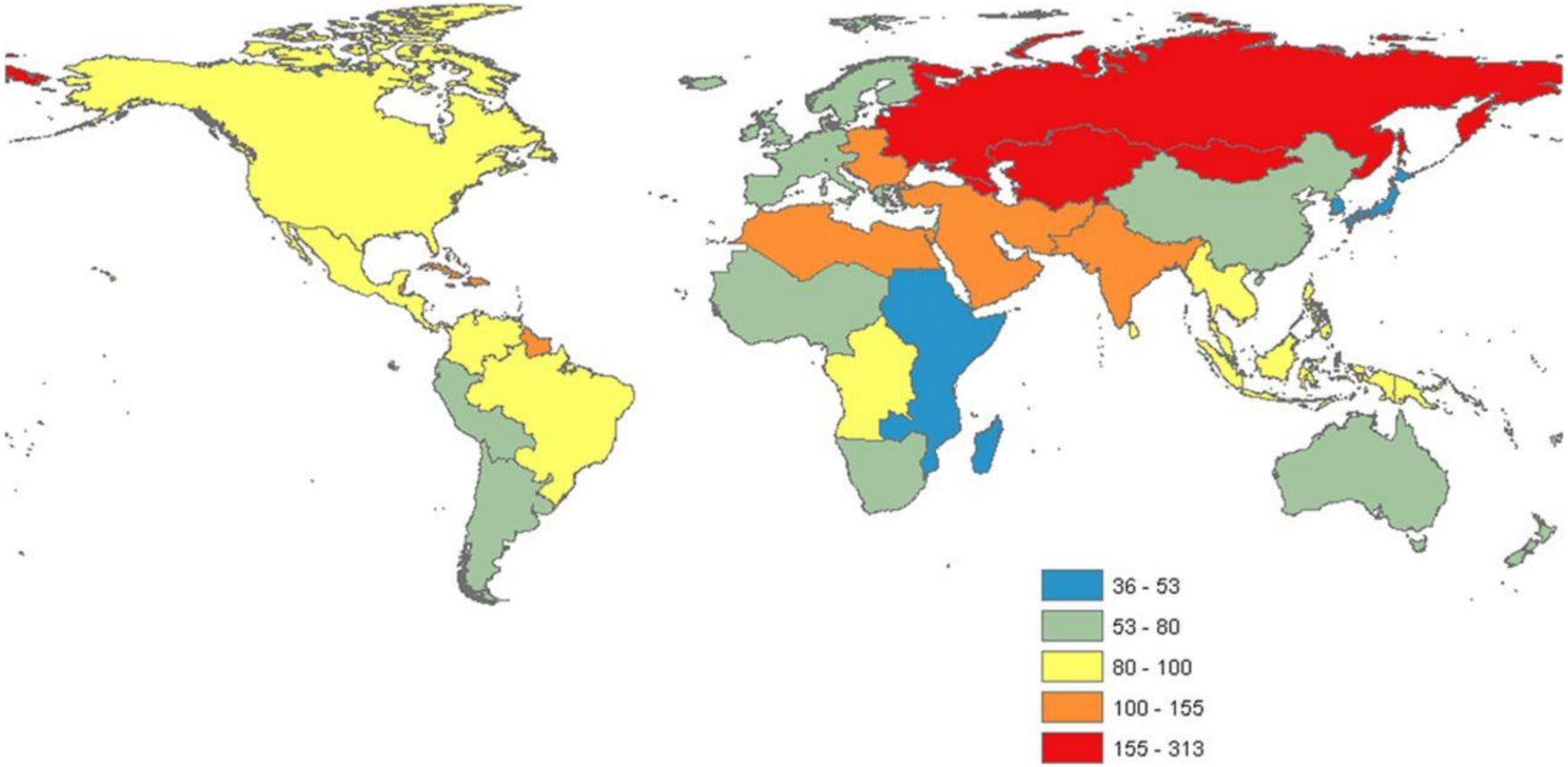
Global Burden of Ischemic Heart Disease/Stroke



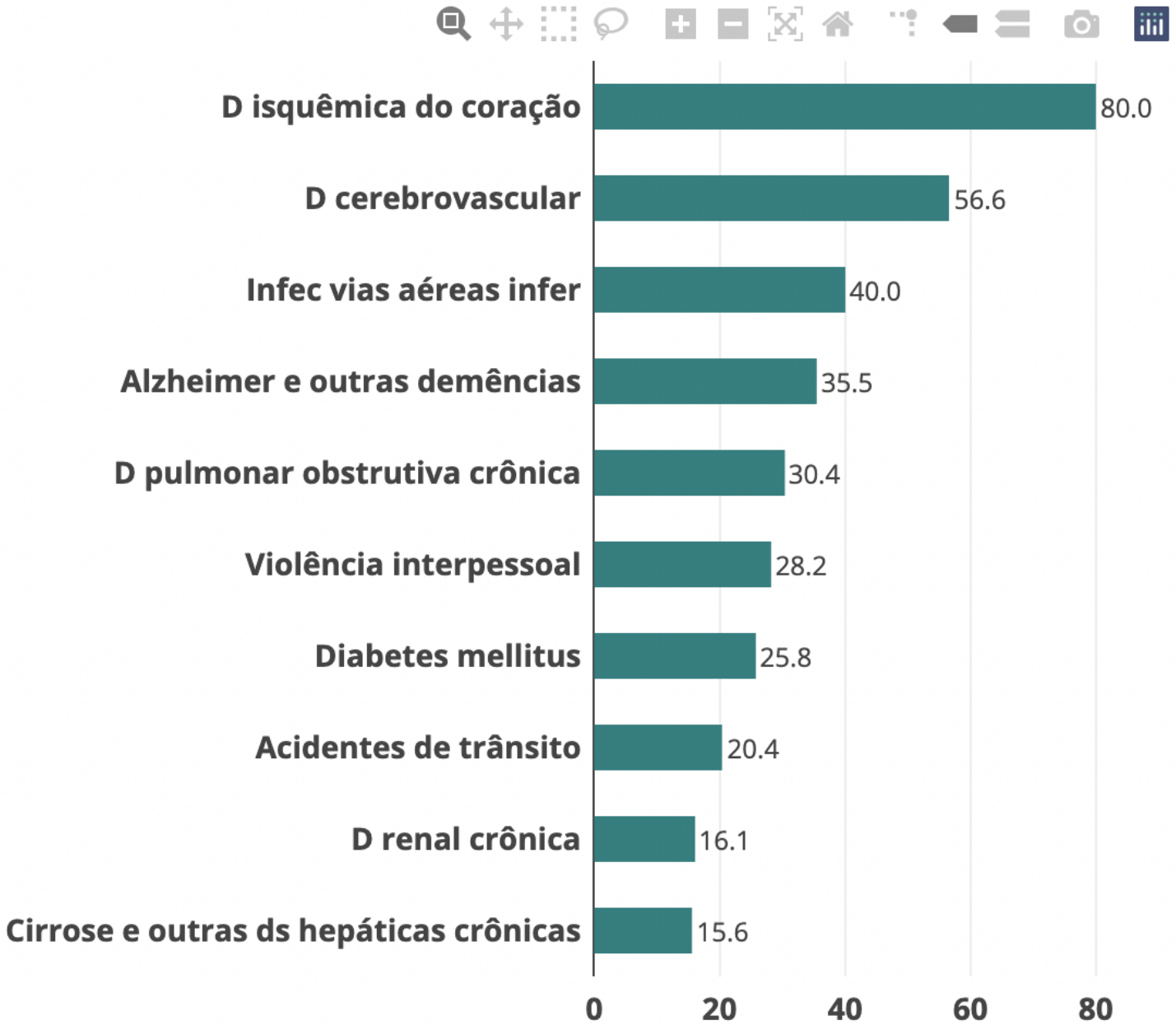
Global Ischemic Heart Disease Mortality Rates

Map of age-standardized ischemic heart disease mortality rate per 100,000 persons in 21 world regions, 2010



Moran A et al. *Circulation*. 2014;129:1483-1492.

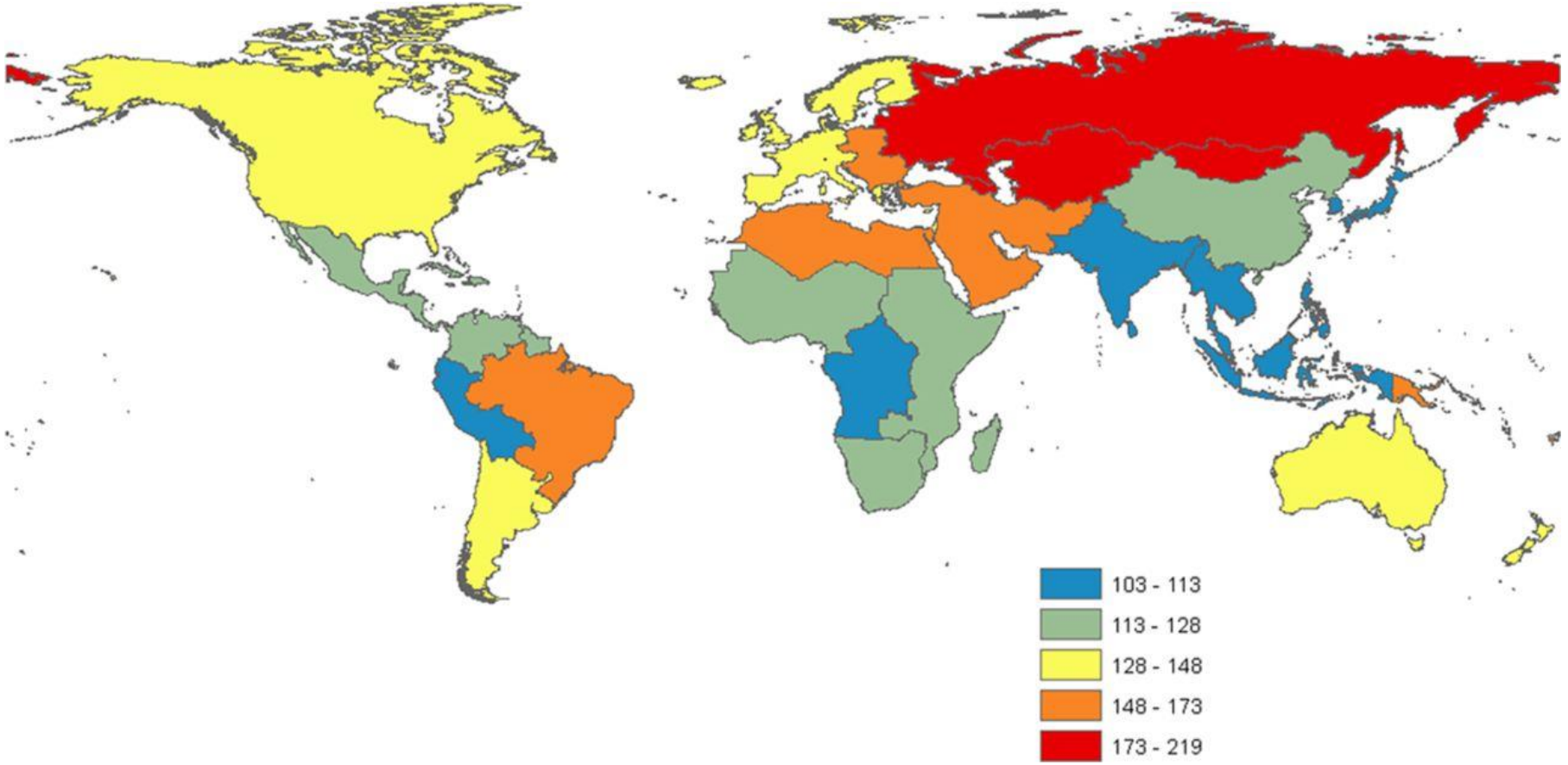
10 principais causas de mortalidade em Brasil, ambos todas as idades (padronizado), 2017



Sec Vigilância em Saúde
Gov. Federal

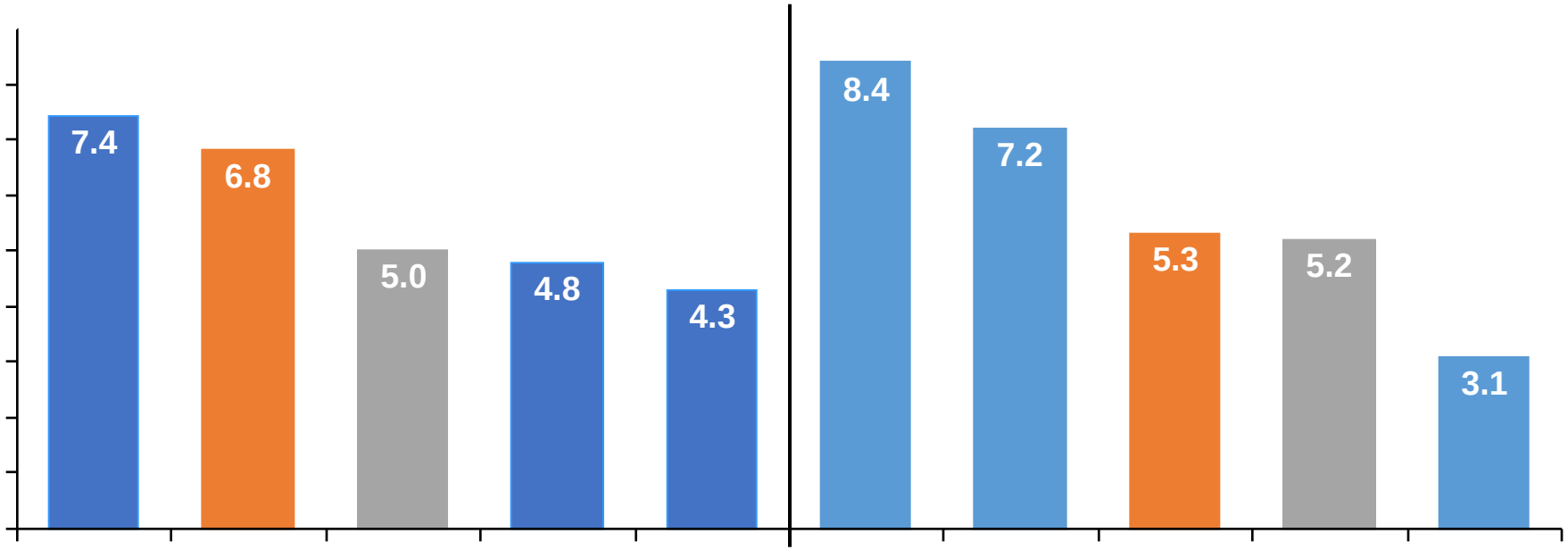
Years of Life Lived With Disability Attributable to Ischemic Heart Disease in 2010

The absolute global burden of IHD increased by 29 million DALYs (29%) between 1990 and 2010



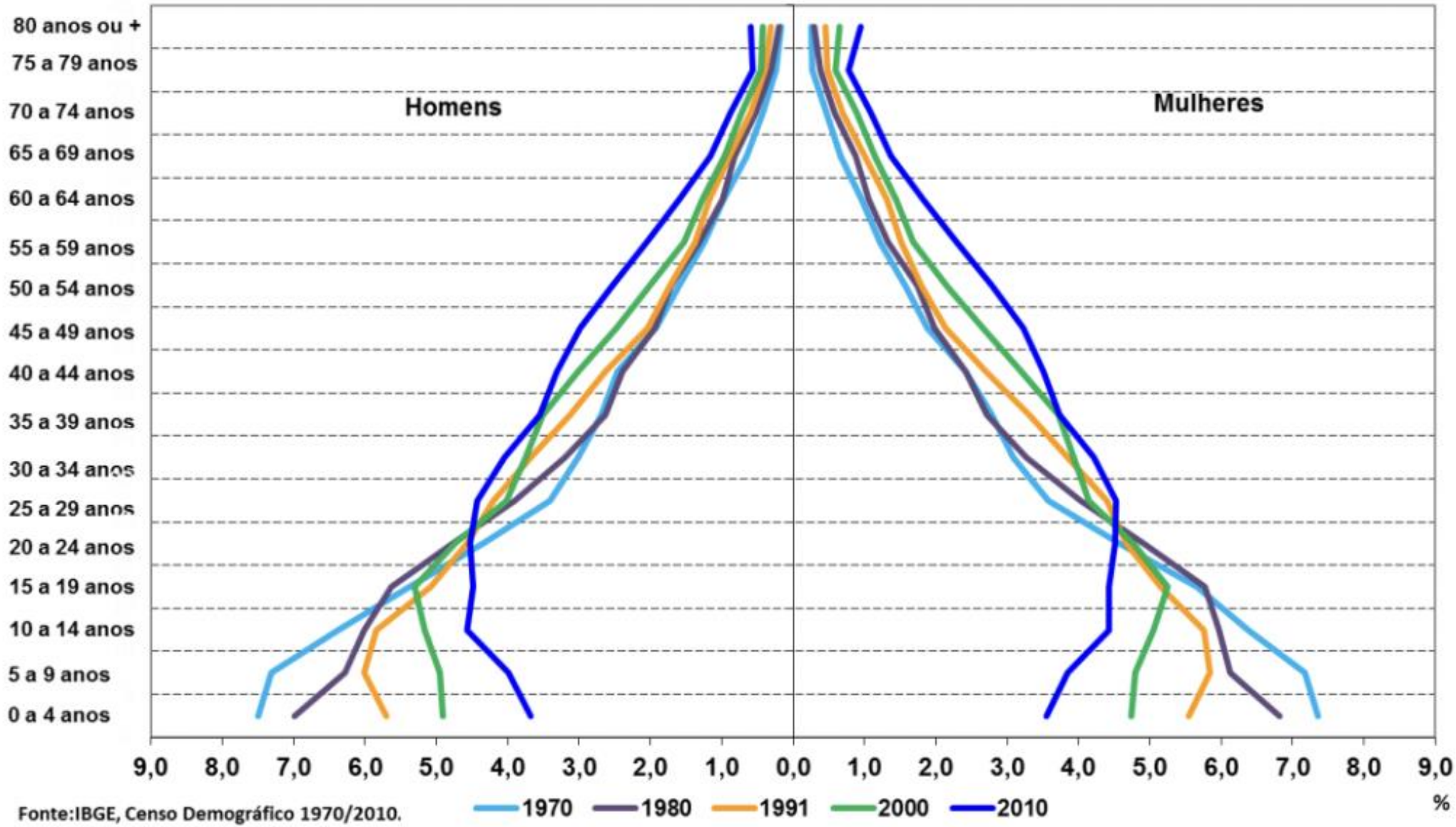
Moran A et al. *Circulation*. 2014;129:1493-1501.

Percentage of Disability-Adjusted Life Years Lost Due to Top 5 Diseases



World Health Organization. Atlas of Heart Disease and Stroke. 2010.

Gráfico 8 - Composição relativa da população residente total, por sexo e grupos de idade -Brasil - 1970/2010



Fonte:IBGE, Censo Demográfico 1970/2010.

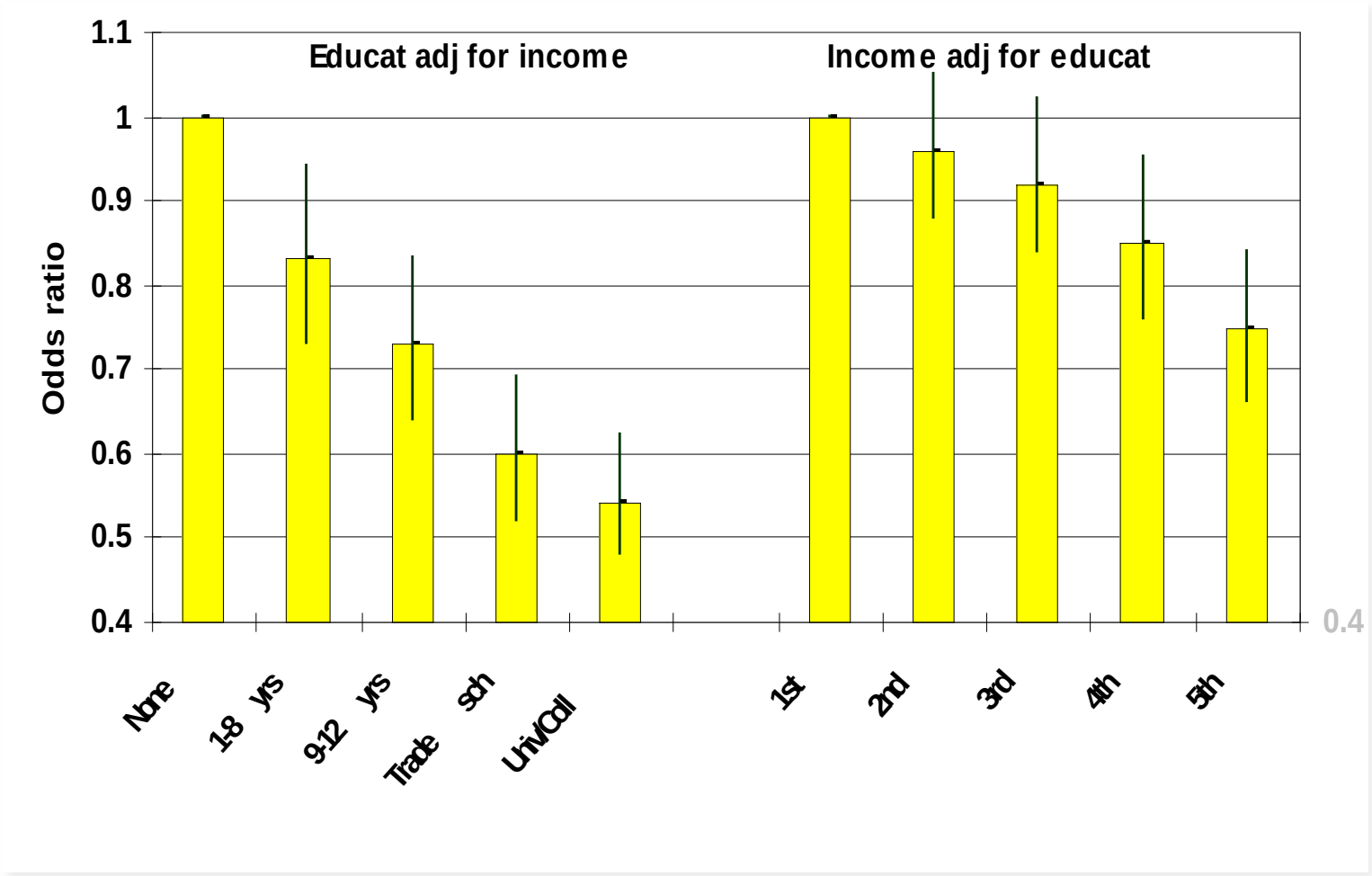
Final cost of heart conditions in Brazil, 2015(millions of reais)

Category	HF	MI	AF	HTN	Total (unad-justed)	Total (adjusted for comorbid-ities)^
Health system costs	14,469	16,119	3,697	1,098	35,382	35,382
	65%	72%	94%	14%	63%	63%
Productivity losses	7,663	6,257	225	6,927	21,071	20,858
	35%	28%	6%	86%	37%	37%
Income forgone by individuals*	*3,528*	*4,540*	*156*	*2,063*	*10,287*	*10,196*
	16%	*20%*	*4%*	*26%*	*18%*	*18%*
Income forgone by businesses*	*333*	*403*	*31*	*4,378*	*5,145*	*5,050*
	2%	*2%*	*1%*	*55%*	*9%*	*9%*
Opportunity cost of informal care by family/friends	*2,404*	*196*	-	-	*2,600*	*2,596*

22.375 billions

Bryce Stevens et al The Economic Burden of Heart Diseases in Brazil. World Congress of Cardiology & Cardiovascular Health 2016

Odds ratio for AMI According to Education and Income



INTERHEART Investigators Lancet 2004; 364: 937-52.

Projected Supply and Demand, Physicians Active in Patient Care

33,100 physicians shortage - cardiology, oncology, and emergency medicine

Year	Physician Supply (All Specialties)	Physician Demand (All Specialties)	Physician Shortage (All Specialties*)	Physician Shortage (Non-Primary Care Specialties)
2008	699,100	706,500	7,400	None
2010	709,700	723,400	13,700	4,700
2015	735,600	798,500	62,900	33,100
2020	759,800	851,300	91,500	46,100
2025	785,400	916,000	130,600	64,800

AAMC Center for Workforce Studies, June 2010 Analysis

Physicians Follow Income percapta

State	percapta	Physicians/1000 hab
DF	R$ 16.361,00	3,42
RJ	R$ 11.459,00	3,35
SP	R$ 11.353,00	2,23
RS	R$ 9.958,00	2,02
AP	R$ 4.996,00	0,82
TO	R$ 2.931,00	0,97
PI	R$ 2.113,00	0,78
MA	R$ 1.949,00	0,56

Socio-Economic Paradox

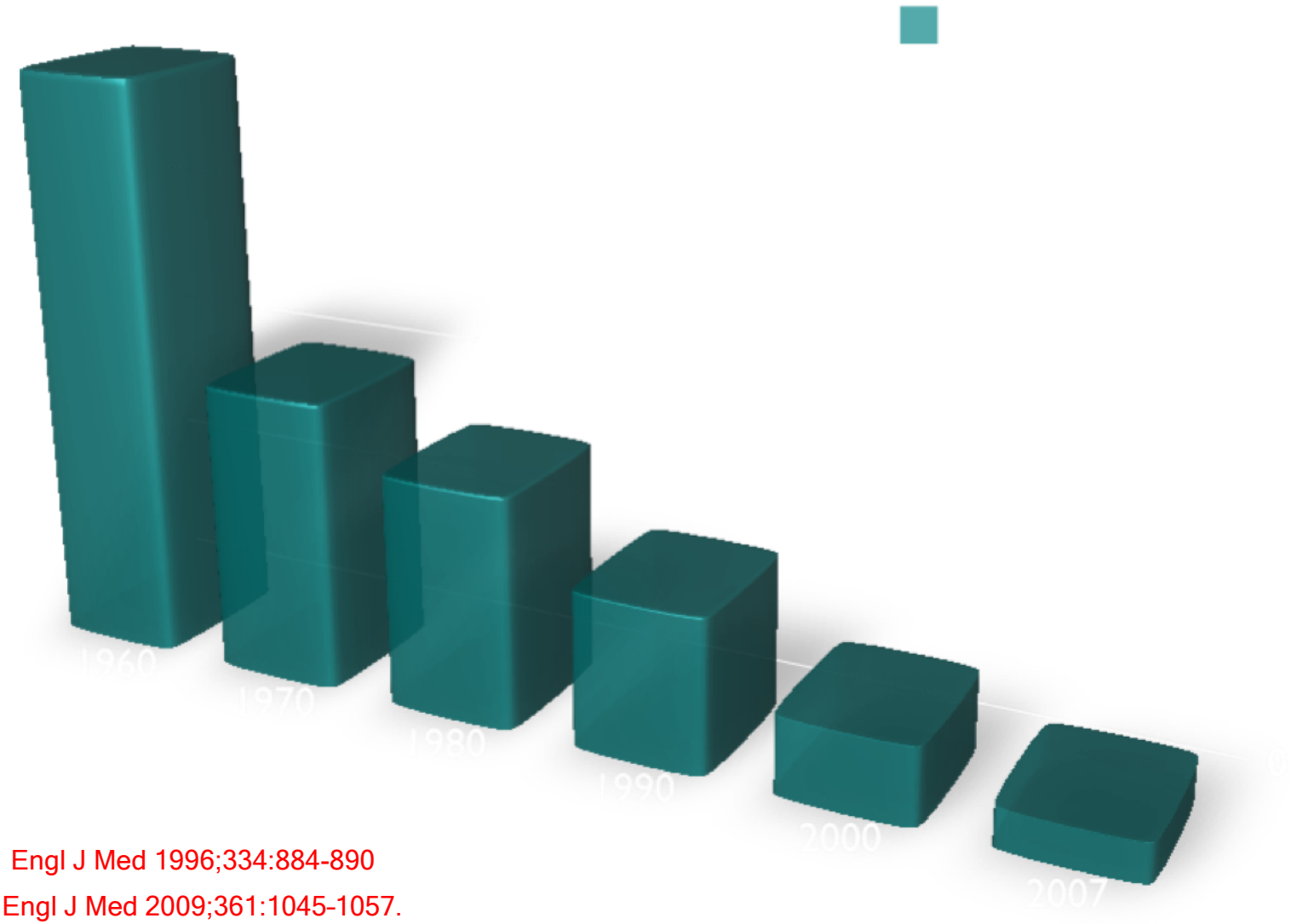
- The Inter-Heart study – cardiac event is inversely proportional to per capita income and the education level of citizens

- Poor people :
  - are more susceptible to the cardio vascular disease
  - have the worst access to health systems.

- Geographic distribution of Health System
  - the less developed a city is, the fewer the doctors
  - The less developed an area, the fewer the hospital beds
  - Cardiologists, represent less than 5% of total doctors

Latin America

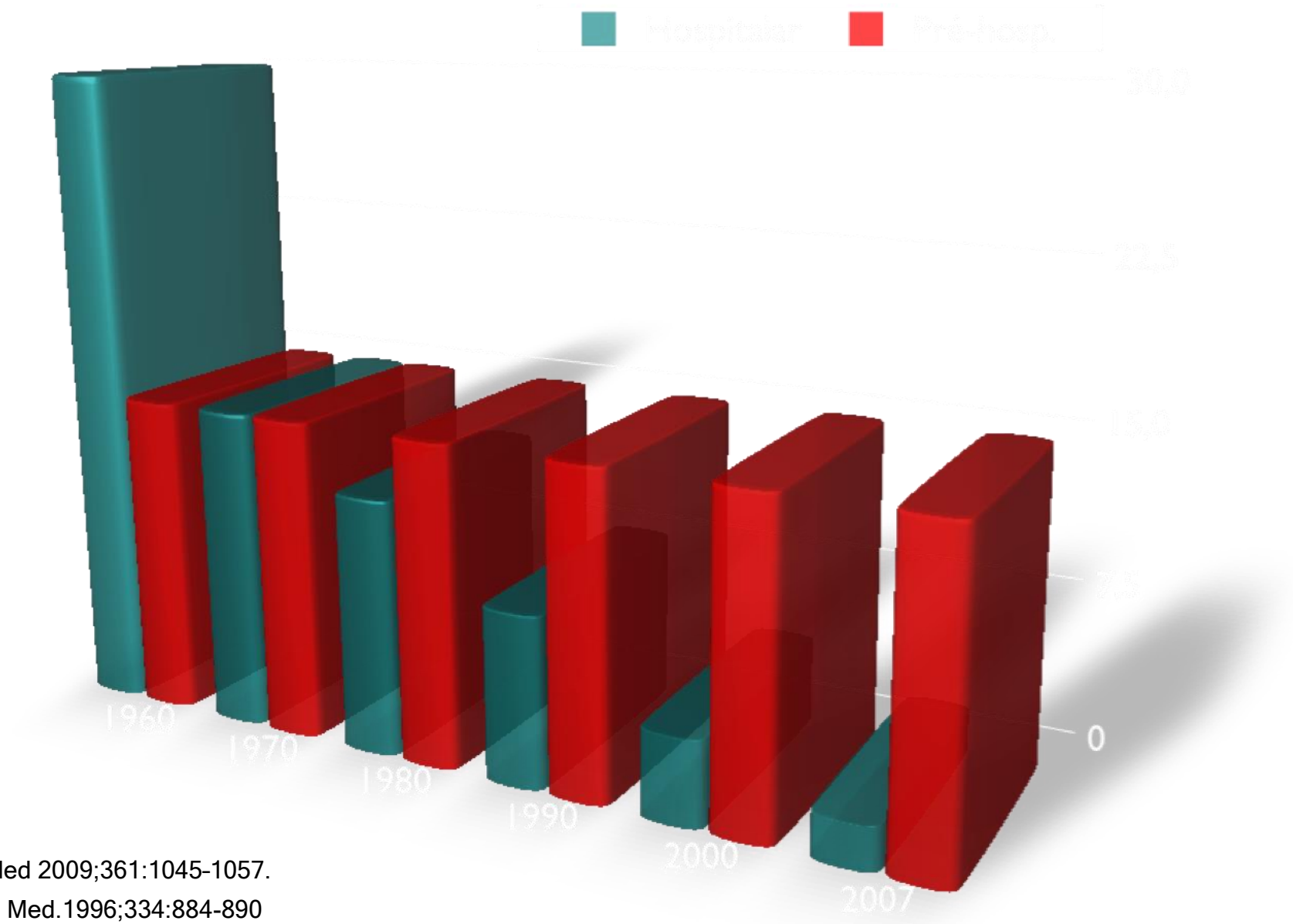
AMI Hospital Mortality



N Engl J Med 1996;334:884-890

N Engl J Med 2009;361:1045-1057.

The pre-Hospital Figures



N Engl J Med 2009;361:1045-1057.

N. Engl. J. Med.1996;334:884-890

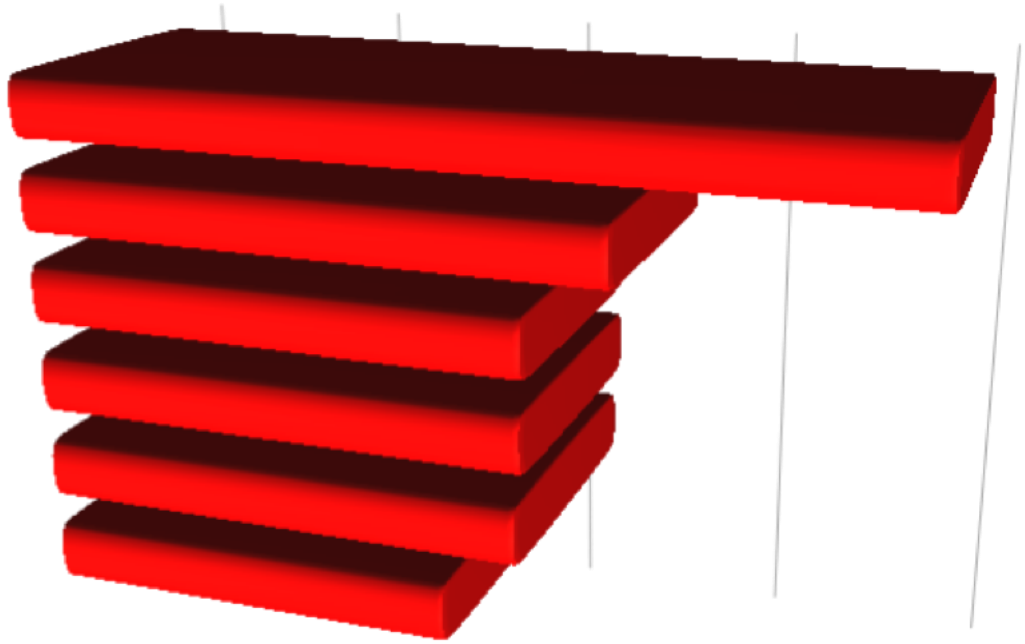
J Am Coll Cardiol 2002; 40(4):579-651

The Pre-hospital Challenge

- The first symptom is STEMI in 50%
- Majority of deaths within first 2 h
- Less than 23% use EMS.
- More than 83% would use EMS if they knew that it was an STEMI.
- Almost 60% are driven by lay people and 16% drive their own car!

Michael Gibson Circulation 2001,104:2632-2634
Brown AL Circulation 2000;102:173-8

Chest Pain Cost effectiveness



Polanczyk et al. Ann Intern Med Dez 1999

The Value formula – a balancing act

$$\textbf{Value} = \text{appropriateness} * \left[\frac{quality\ (outcomes)}{costs\ (over\ the\ full\ cycle\ of\ care)}\right]$$

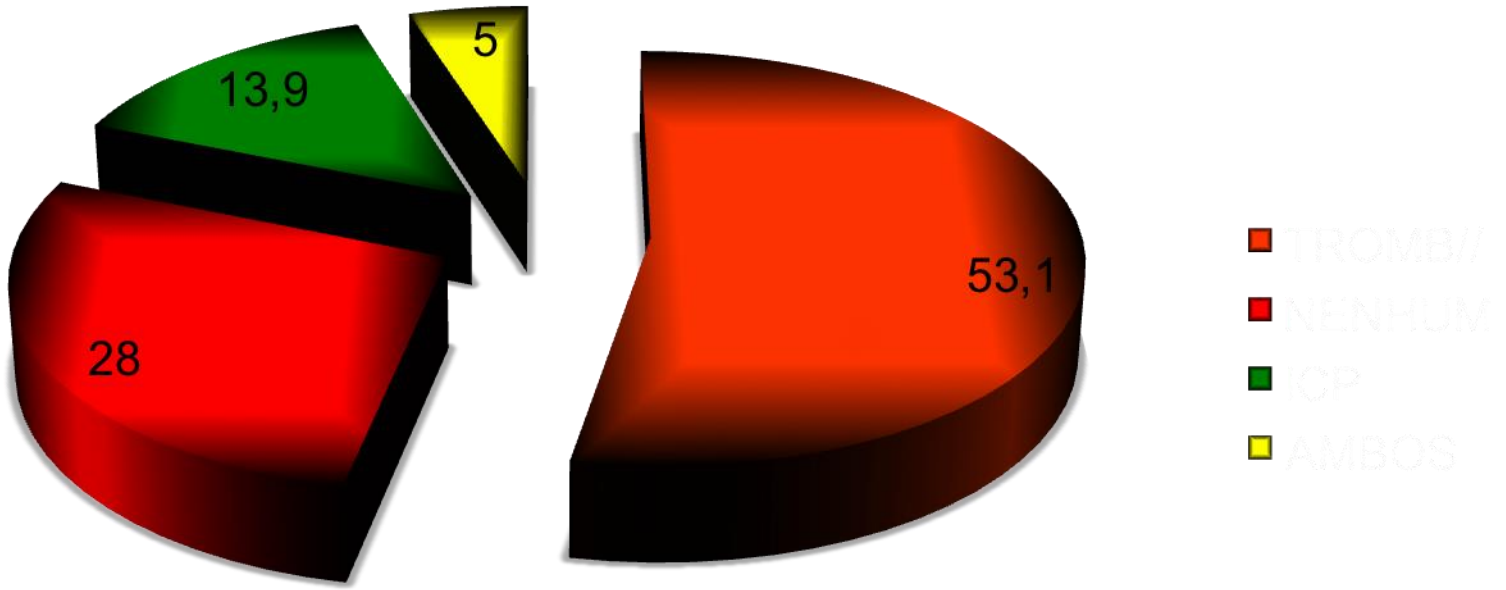
Balancing Quality Incentives…

- Improvements in outcome measures
- Reductions in Potentially Avoidable Complications (PACs)

…with Cost Incentives

- Efficiency rewards
- Shared savings
- Risk sharing

GRACE
Reperfusion Brazil/Argentina



*P<0.01 (Chi Square test)

Eagle KA, Goodman SG. Lancet 2002:359:373-377.

ACUTE CORONARY SYNDROME

Striving to meet targets for ideal treatment of acute myocardial infarction in Brazil: Data from the Midwest region

Gustavo Carvalho MD, PhD, Salvador Rassi MD, PhD, Enio Guérios MD, PhD, Fernando A. M. Curado MD, Ana Tereza Bastos MD

Pages: 450-454 | First Published: 21 January 2018

Abstract | Full text | PDF | References | Request permissions

EDITORIAL

ACUTE CORONARY SYNDROME

Editorial: Deconstructing STEMI Chaos

Roberto Botelho MD, PhD, Sameer Mehta MD, FACC, MBA

Pages: 455-457 | First Published: 08 August 2018

Full text | PDF | References | Request permissions

DOI: 10.1111/joic.12544

WILEY Journal Of Interventional Cardiology

This editorial refers to "Striving to meet targets for ideal treatment of Acute Myocardial Infarction in Brazil: Data from the Midwest region", by Carvalho G et al.[1]

In this issue of the Journal of Interventional Cardiology, Carvalho et al aimed to evaluate the systematic chain of care for patients with acute ST-elevation myocardial infarction (STEMI) referred for primary angioplasty.

Before proceeding to discuss the relevance of the subject, we would like to provide our analysis of the manuscript.

The evaluation of th survival bias as the retros arrived at the tertiary cer survived the pre-hospital network since the first m during the pre-hospital t included refers to the tert their patients had sympto than 24 h. There is a lack times and whether the patient or pre-hospital system delays contributed to the overall metrics. The median symptom onset-to-balloon time was 32 h. Only 6% patients arrived within 12 h of symptom onset and were treated with primary angioplasty.

In contrast to these long pre-hospital delays, among patients who got primary angioplasty, median door-to- balloon (DTB) time was 37 min and clearly in accordance with guideline recommendations.

These data add to a growing body of information regarding the need for developing regional STEMI network in developing countries.

The WHO has alerted that the global burden of cardiovascular mortality for the next decades is expected to predominantly occur in developing countries.[2] Despite that, the death rates due to

Improvements in health technologies tend to increase disparities in health across education groups because education enhances the ability to exploit technological advances. The gradients in socioeconomic status are, in part, a consequence of the relationship between education and technological improvement.[8]

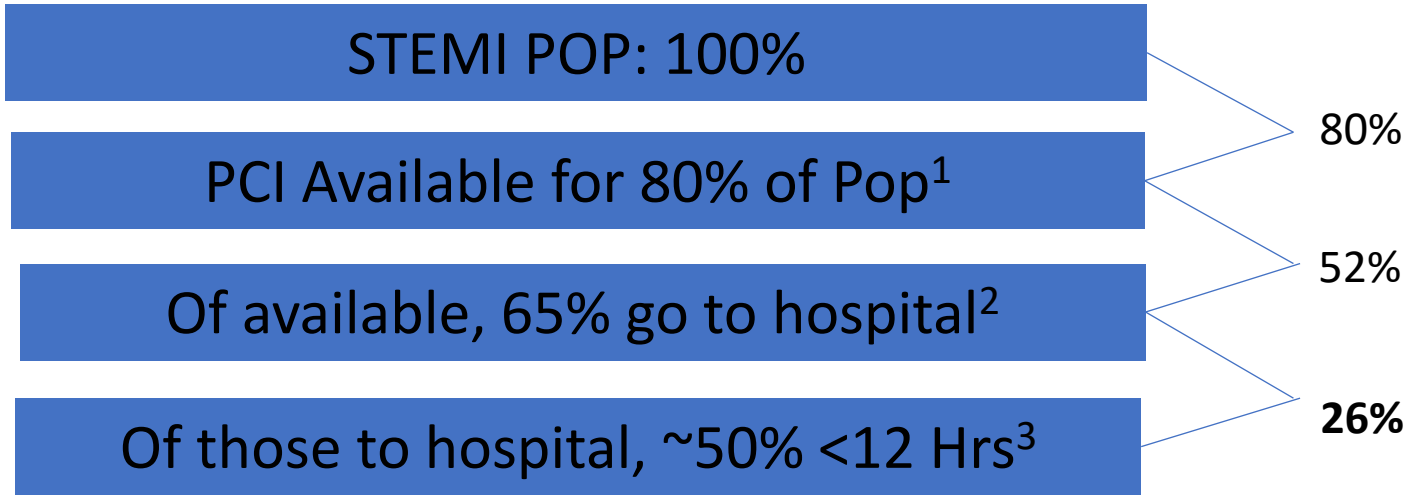
The economic burden of AMI in Brazil was estimated to be around 6.8 Billion USD in 2015. Health system costs were 72% and they were borne by government, private insurers and individuals; productivity losses were 28% and it were borne by individuals, governments (in the iends (who reduced ant wellbeing loss,

ENGE

resides in the pre- between symptom was established by the first thrombolytic trials. In 2006, the American College of Cardiology (ACC) launched the Door-to-Balloon Alliance with a goal of providing treatment within 90 minutes after arrival for at least 75% of patients with STEMI who present directly to a PCI-capable hospital.[11] But the critical time to be addressed was the very early onset of symptoms: it is where the larger delay resides and, more importantly, the golden opportunity is the first two hours.[12]

Once the majority of patients with STEMI presents to hospital without PCI capability, the need for hospital transfer for primary PCI brings another challenge for early reperfusion: the DIDO delay from the referring center. At this stage, other challenges are introduced to

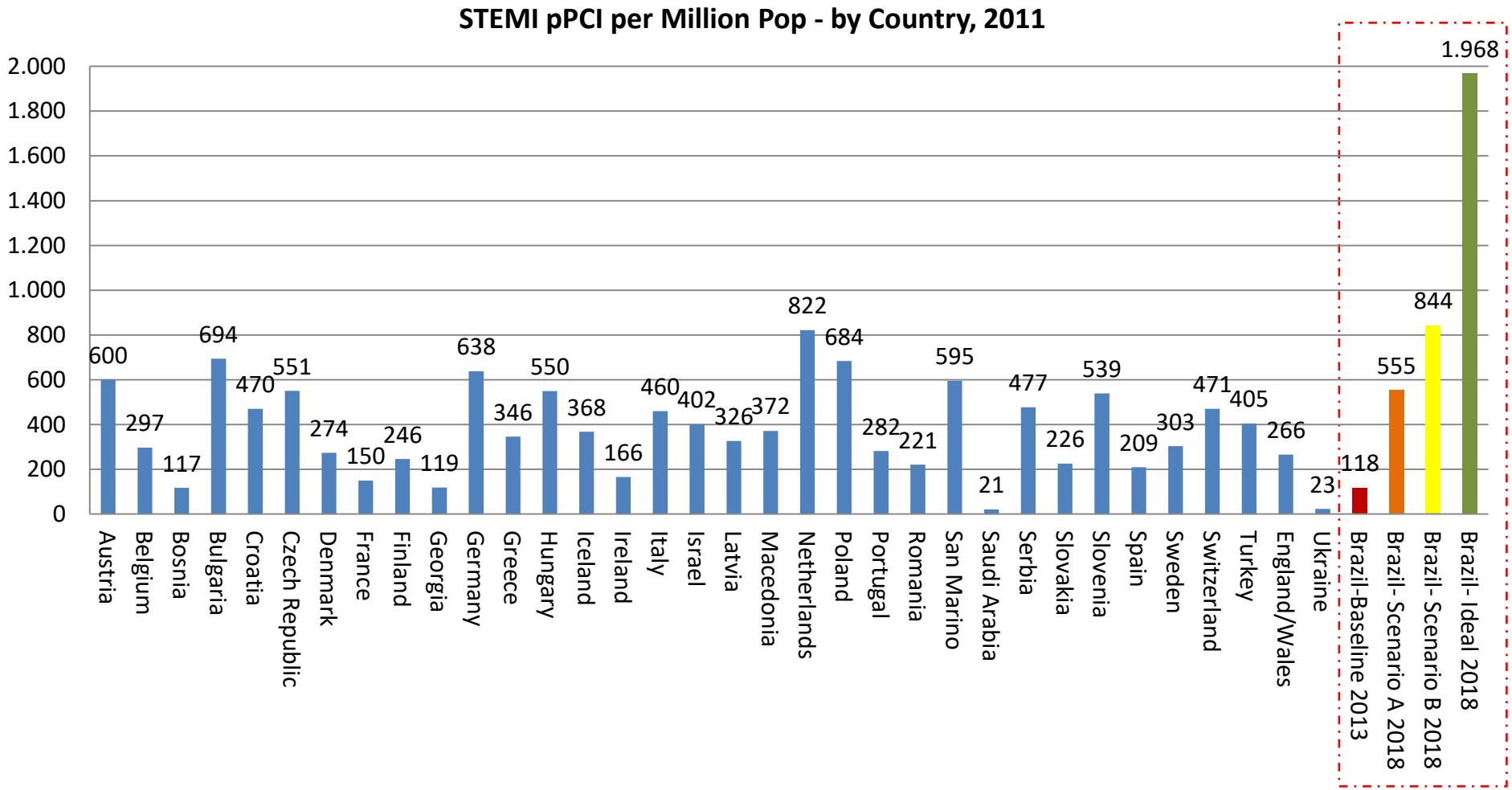
Estimate of STEMI Pop who Arrive <12 HRs



1) *Cardiology in Brazil: A Country in Development* (Chagas MD, 2010)
2) *American Journal of Cardiology; V.111; 3/13; p914:* "World-wide, unrecognized MI consists of at least 25-40% of all MI" – is consistent with 52% making to hospital.
3) *Coronary Artery Disease in Brazil: contemporary management and future perspectives* (Polanczyk, 2009)

Model uses 26% for People to Hospital <12 Hrs at Baseline in 2013

Comparing PCI per Million Population



Source: Reperfusion Therapy for ST Elevation Acute Myocardial Infarction 2010/2011: Current Status in 37 ESC Countries

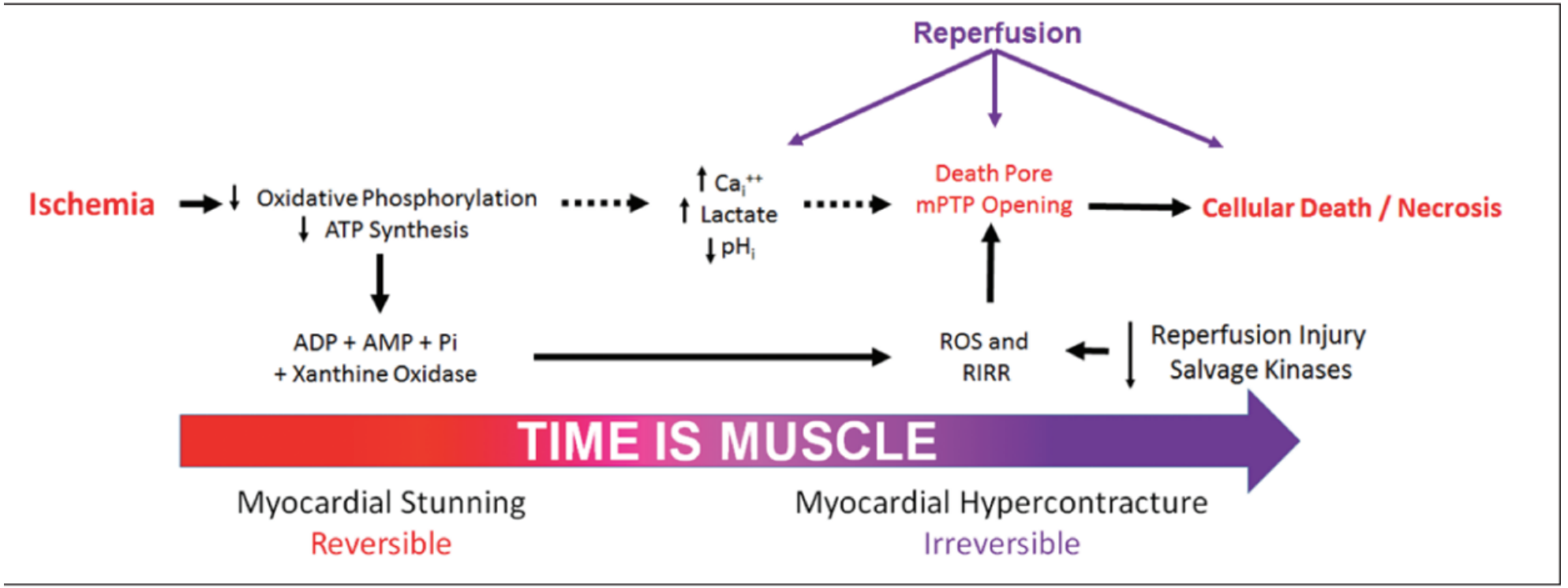
2017 AHA/ACC Clinical Performance and Quality Measures for Adults With ST-Elevation and Non–ST-Elevation Myocardial Infarction: A Report of the American College of Cardiology/American Heart Associati[illegible] Task Force on Performance Measures

17 MEASURES

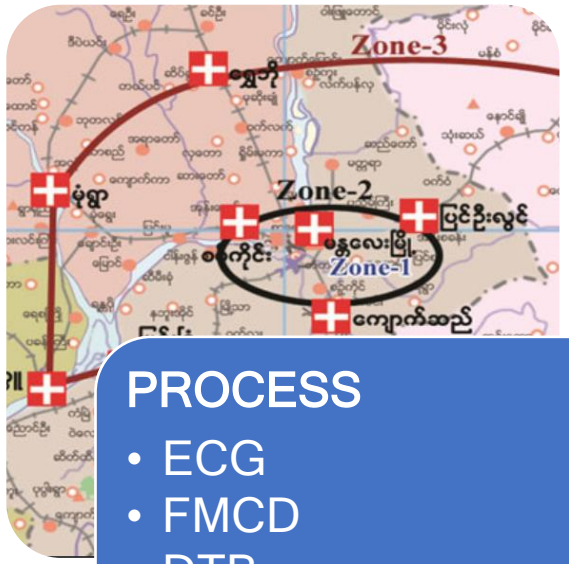
Hani Jneid, Daniel Addison, Deepak L. Bhatt, Gregg C. Fonarow, Sana Gokak, Kathleen L. Grady, Lee A. Green, Paul A. Heidenreich, P. Michael Ho, Corrine Y. Jurgens, Marjorie L. King, Dharam J. Kumbhani, and Samir Pancholy **See fewer authors**

Originally published 21 Sep 2017 | https://doi.org/10.1161/HCQ.0000000000000032 | Circulation: Cardiovascular Quality and Outcomes. 2017;10

TIME and QUALITY of Reperfusion

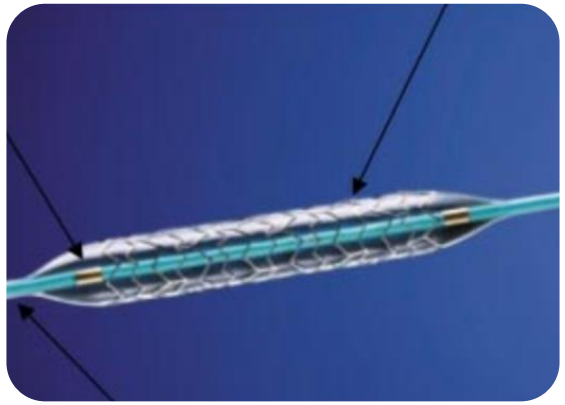


AMI Measures



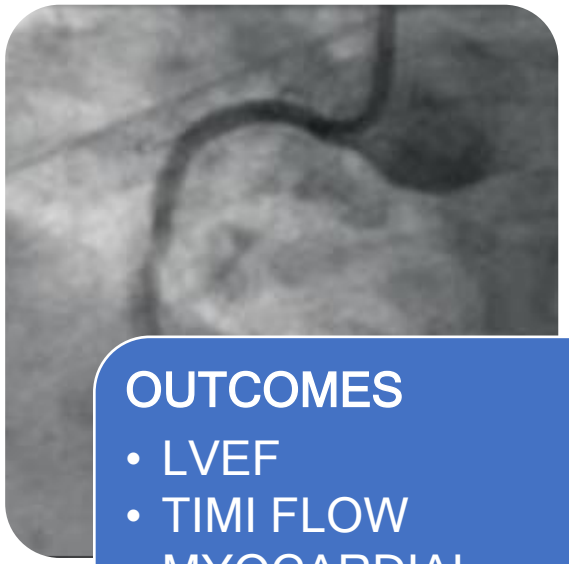
PROCESS

- ECG
- FMCD
- DTB
- DTN
- DIDO
- DTUL



PROCEDURE

- AAS, BBLOCK, STATIN
- DAPT
- RADIAL ACCESS
- ANTICOAGULATION
- REPERFUSION
- ***STENT***
- COMPLETE REVASC.



OUTCOMES

- LVEF
- TIMI FLOW
- MYOCARDIAL PERFUSION
- MORTALITY
- HEMATOMAS
- STROKE

Infarct Networks

Improving prehospital system

PERSPECTIVE

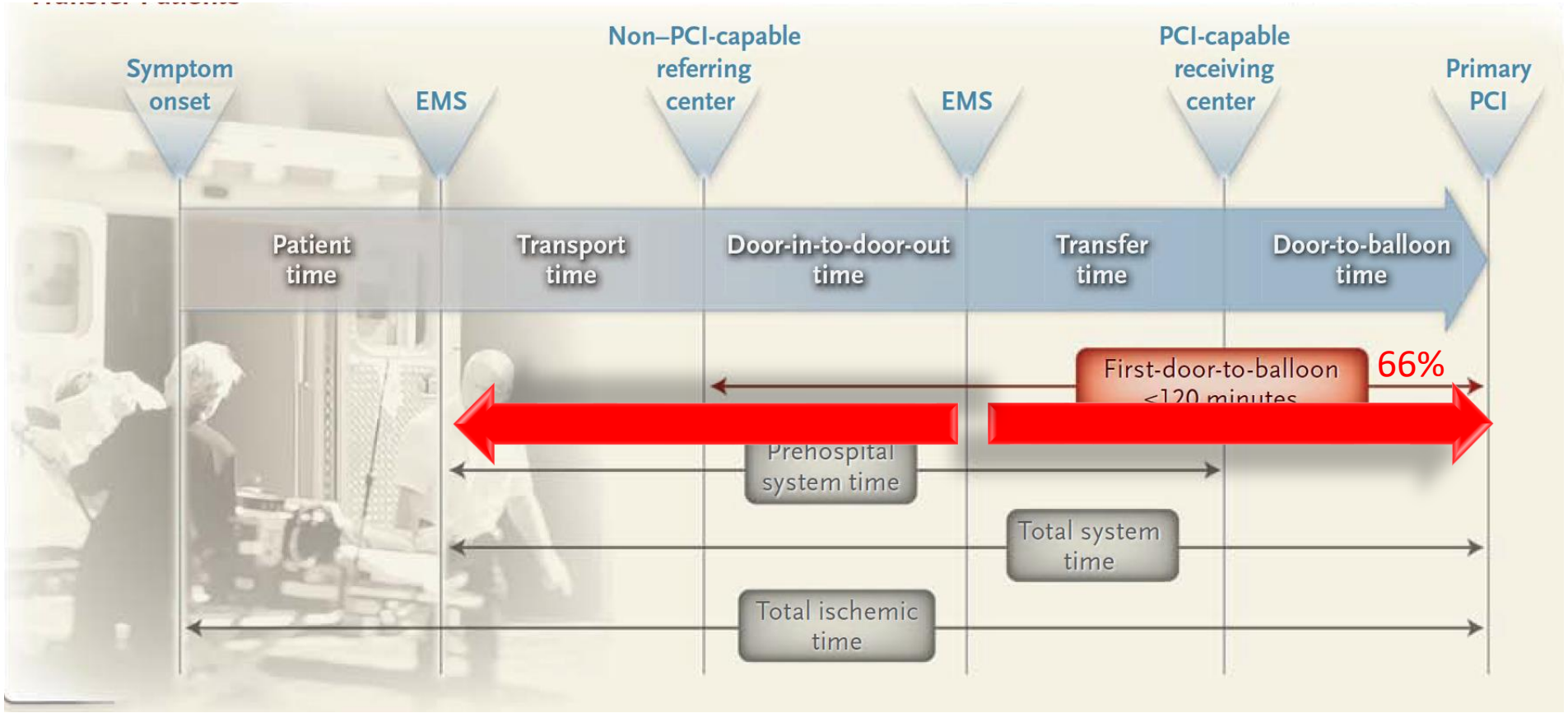
Time to Treatment in Patients with STEMI

Eric R. Bates, M.D., and Alice K. Jacobs, M.D.

N Engl J Med 2013; 369:889-892 | September 5, 2013 | DOI: 10.1056/NEJMp1308772

The focus on door-to-balloon time has expedited arrival in the cardiac catheterization laboratory for patients with ST-segment elevation myocardial infarction. Now the main opportunity for improving outcomes lies in the prehospital system of care, where challenges remain.

Health System Delay



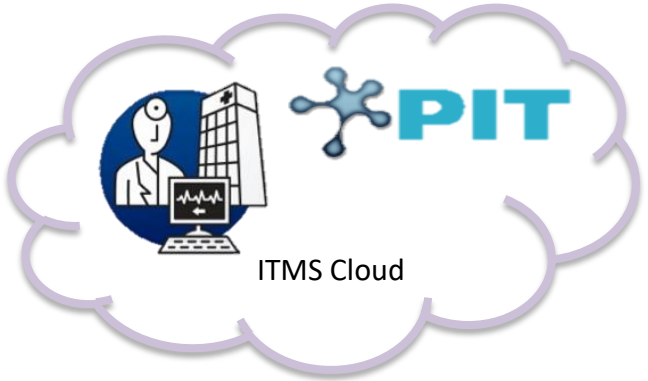
Eric Bates and Alice Jacobs n engl j med 369;10

PROPOSED LATIN STRUCTURE AND MANAGEMENT

Patient

EKG performed
with TM device

Support Decision System



ITMS Cloud

EkG
Report

AI

Non STEMI

Follow
ACS/NSTEMI
management

STEMI
Confirmed

Teleconsultation STEMI Center: urgent D2B or
recommendation of TH

Metrics and Statisctics

LATIN OUTCOMES

LATIN AMERICA

213 CENTERS | 29 HUBs | 184 SPOKEs

LATIN
Latin America Telemedicine Infarct Network

RESULTS

800.950 ECG's

⇩

8597 STEMIS DIAGNOSED

⇩

4169 STEMIS TREATED

BRASIL

104 15 HUBs 89 SPOKEs

- Hosp. Santa Marcelina , SP
- Hosp. Rio Doce, ES
- Hosp. Santa Lúcia, MG
- Hosp. Rocio, PR
- Hosp. Coração, RJ
- Hosp. Encore, GO
- Hosp. Evangélico, PR
- Hosp. Geral do Estado, AL
- Hospital Marieta, SC
- Hosp. São Vicente de Paulo, RS
- Unimed Chapecó, SC
- Hosp. Stella Maris, SP
- Santa Casa de Itabuna, BA
- Hospital Santa Maria, PI
- Prontomed, PI

LATIN

CASE – HSCOR – 1 YEAR RESULTS