Higher resolution insights into acute myocardial infarction care and outcomes: #datasavelives

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LEEDS Institute for Data Analytics

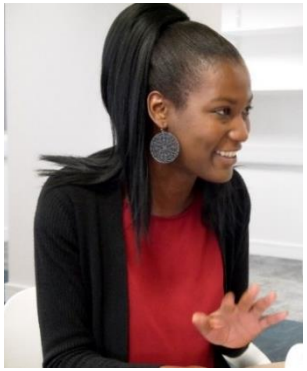
MRC Medical Research Council

wellcome

NHS National Institute for Health Research

British Heart Foundation


Medical Bioinformatics
Centre



Heart attack: #datasavelives

- 1 heart attack every 3 minutes
- 180, 000 hospitalisations per year

- Most deaths from CHD are due to heart attack
- CHD = quarter of all deaths

Wu J. EHJ Acute Cardiovasc Care. 2016 Aug 29. pii: 2048872616661693
BHF Heart Stats

2003

MINAP data sites, 2003 – 2013

National Institute for Cardiovascular Outcomes Research

Myocardial Iscahemia National Audit Project

1.2M

Transcatheter Aortic Valve Implantation

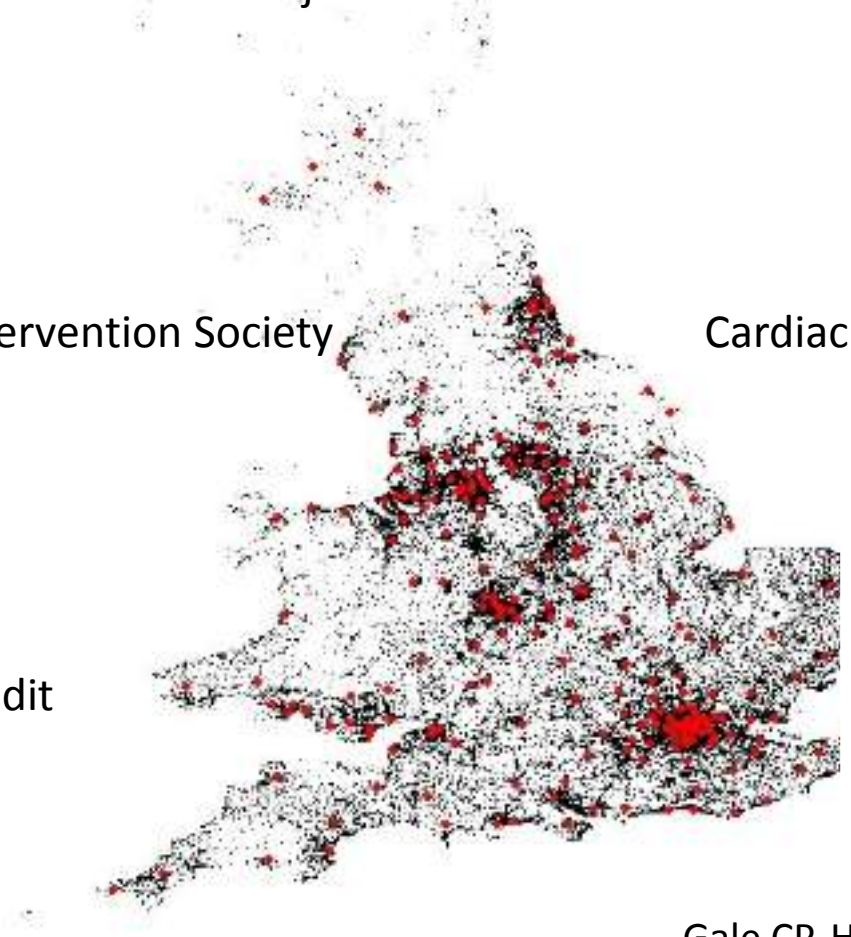
7k

British Cardiovascular Intervention Society

0.8M

Cardiac Rhythm Management

1M



National Heart Failure Audit

0.25M

Cardiothoracic Surgery

0.5M

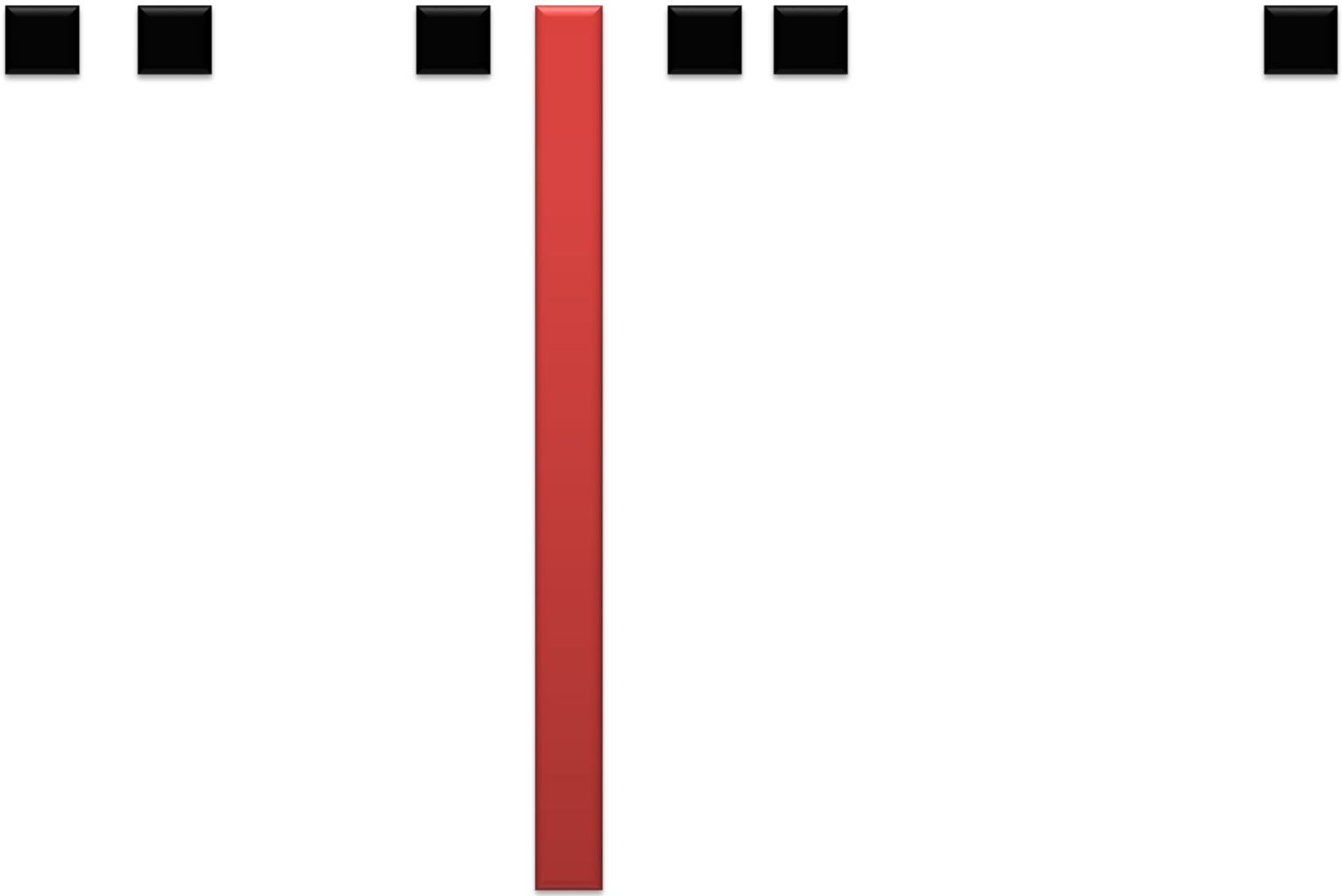
Gale CP. Heart. 2012 Jul;98(14):1040-3

Gale CP. Heart. 2012 Jul;98(14):1040-3

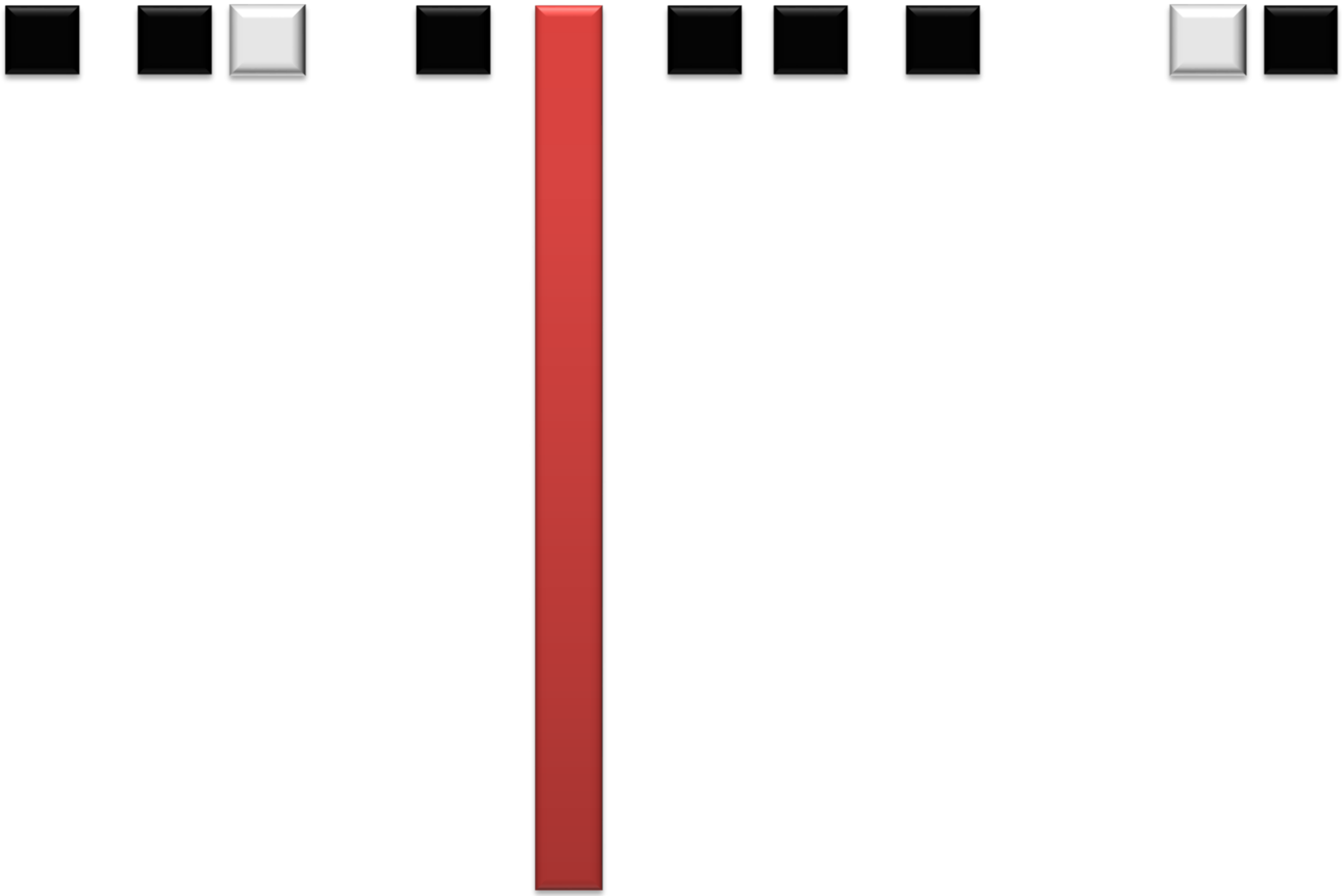
Gale CP. Heart. 2012 Jul;98(14):1040-3

Big Data

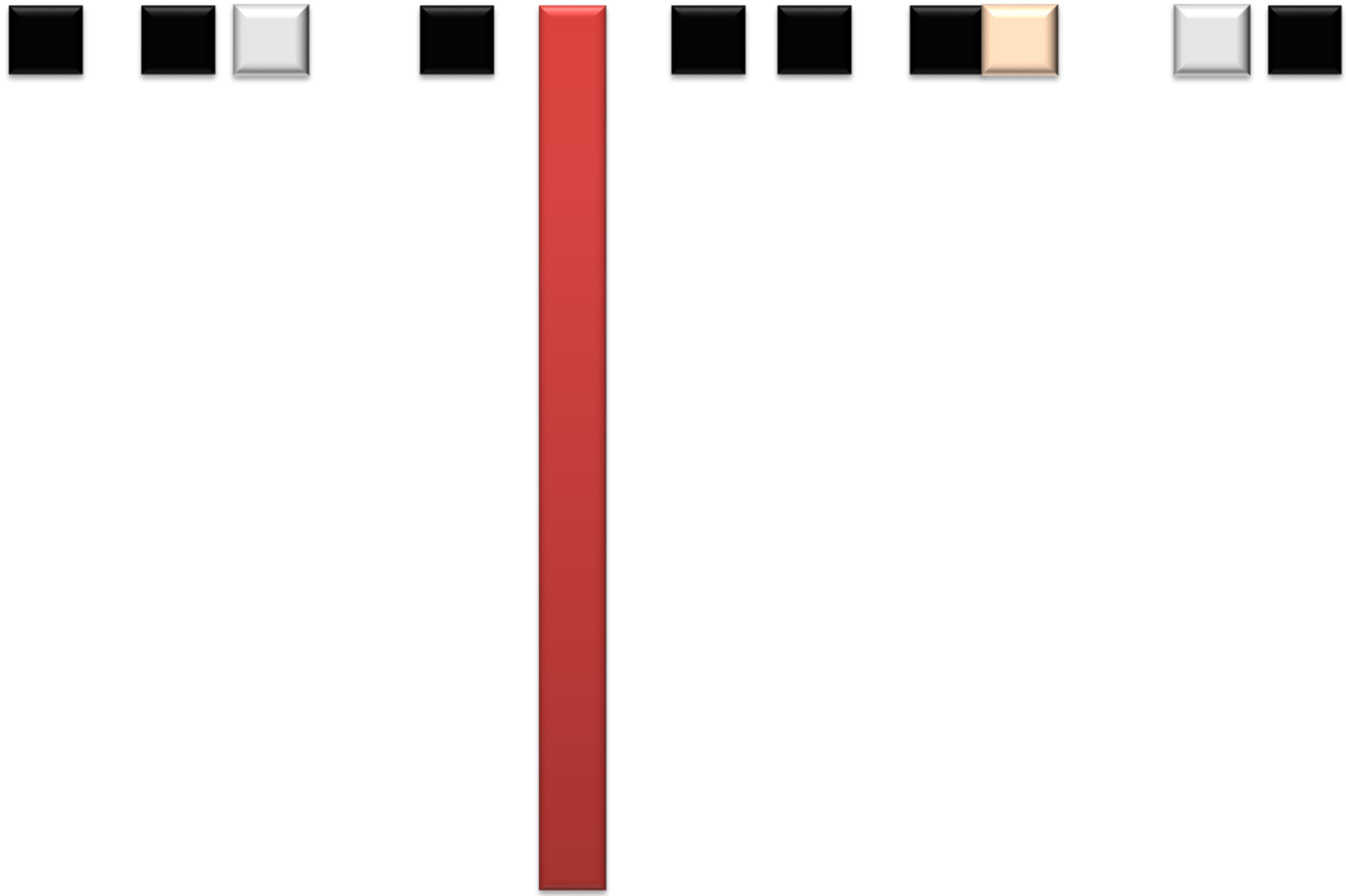
Gale CP. Heart. 2012 Jul;98(14):1040-3



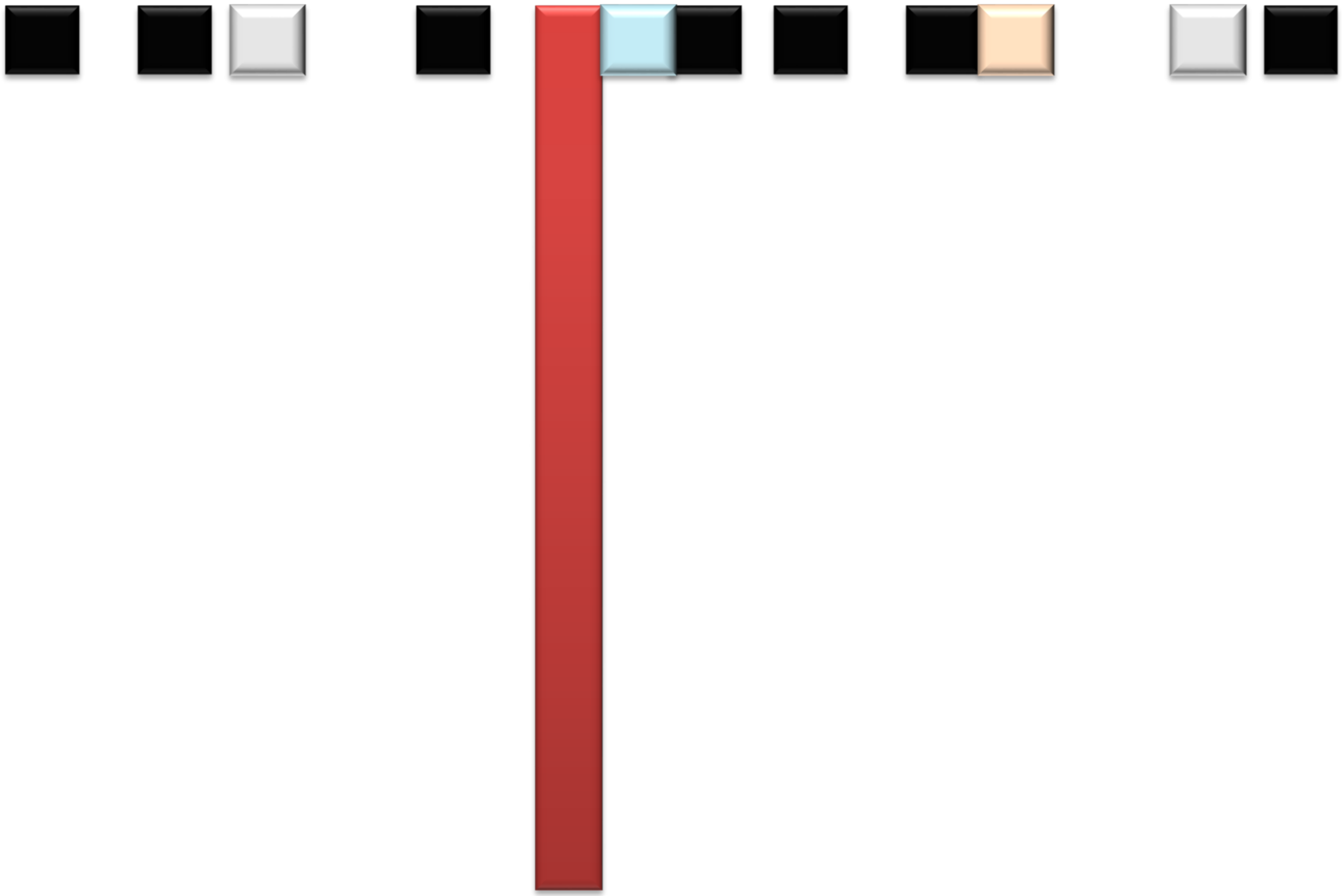
Gale CP. Heart. 2012 Jul;98(14):1040-3



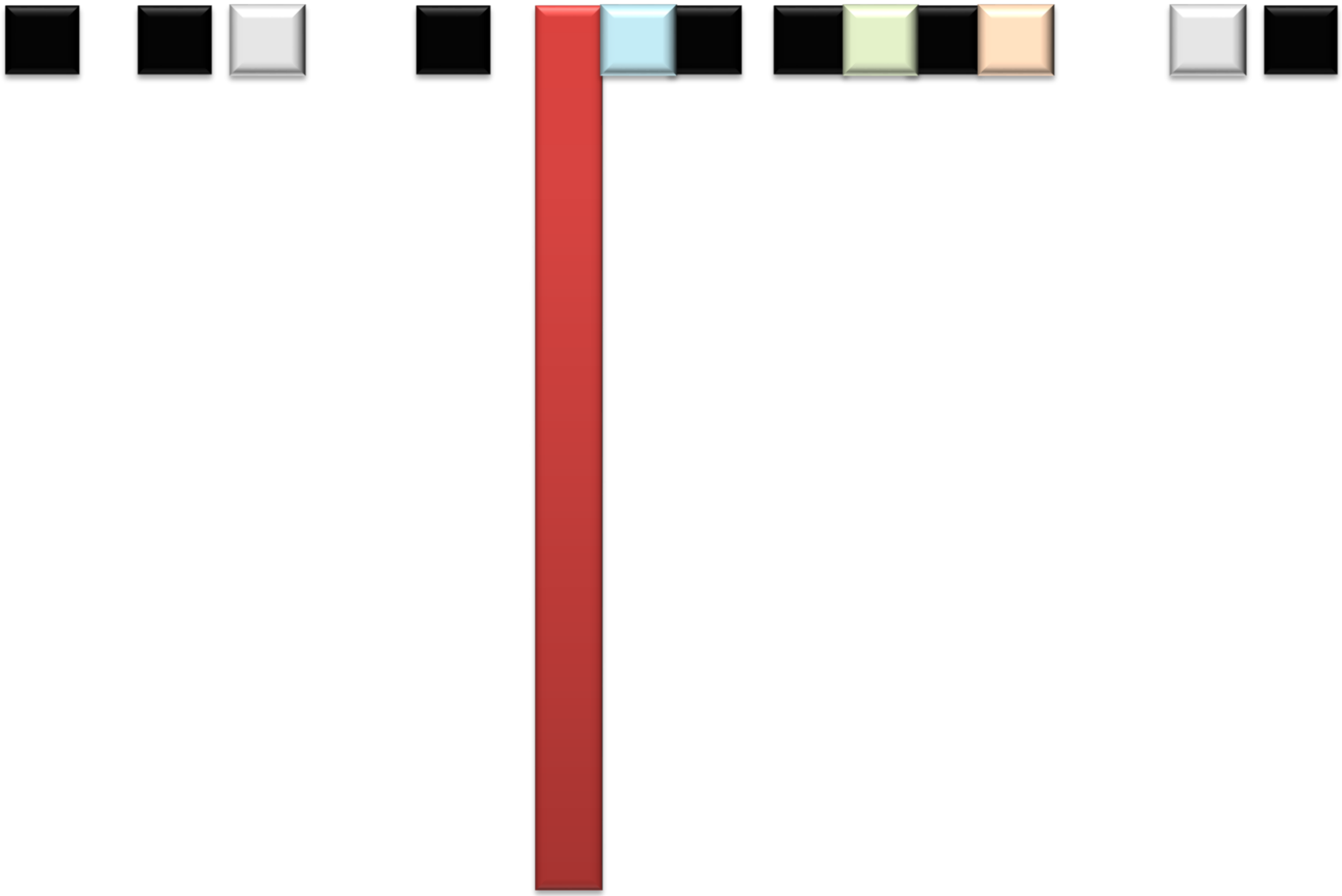
Gale CP. Heart. 2012 Jul;98(14):1040-3



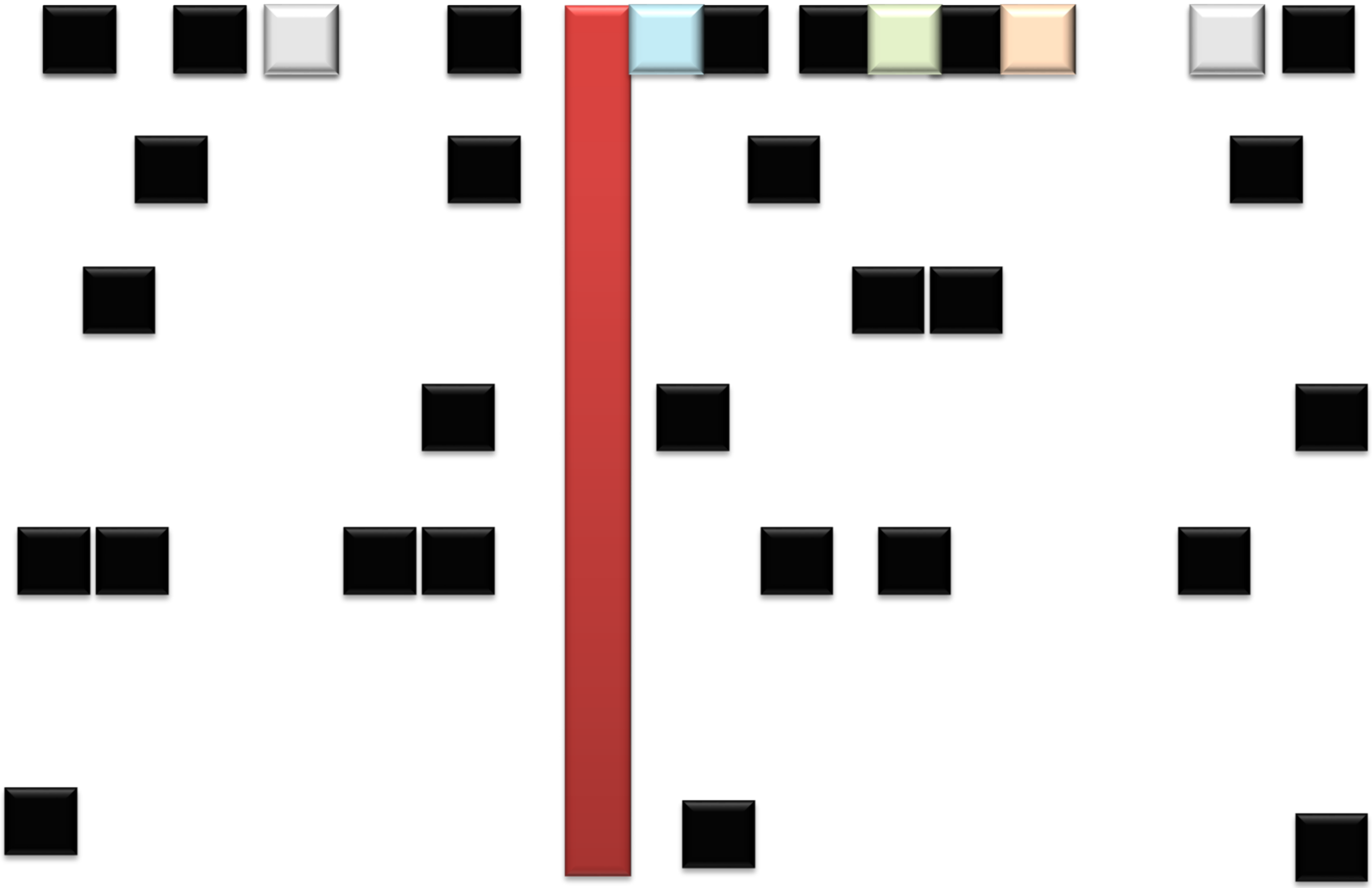
Gale CP. Heart. 2012 Jul;98(14):1040-3



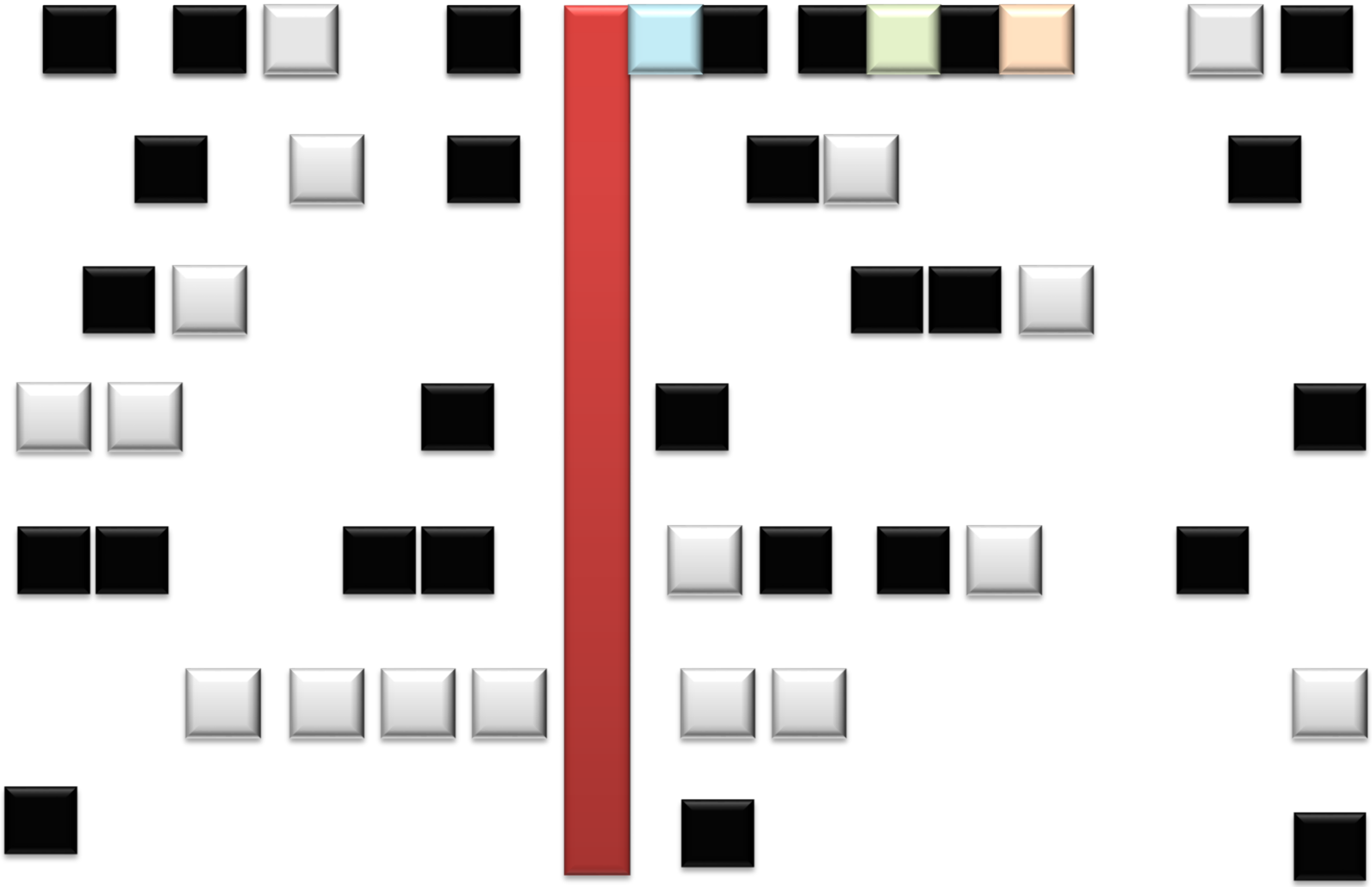
Gale CP. Heart. 2012 Jul;98(14):1040-3



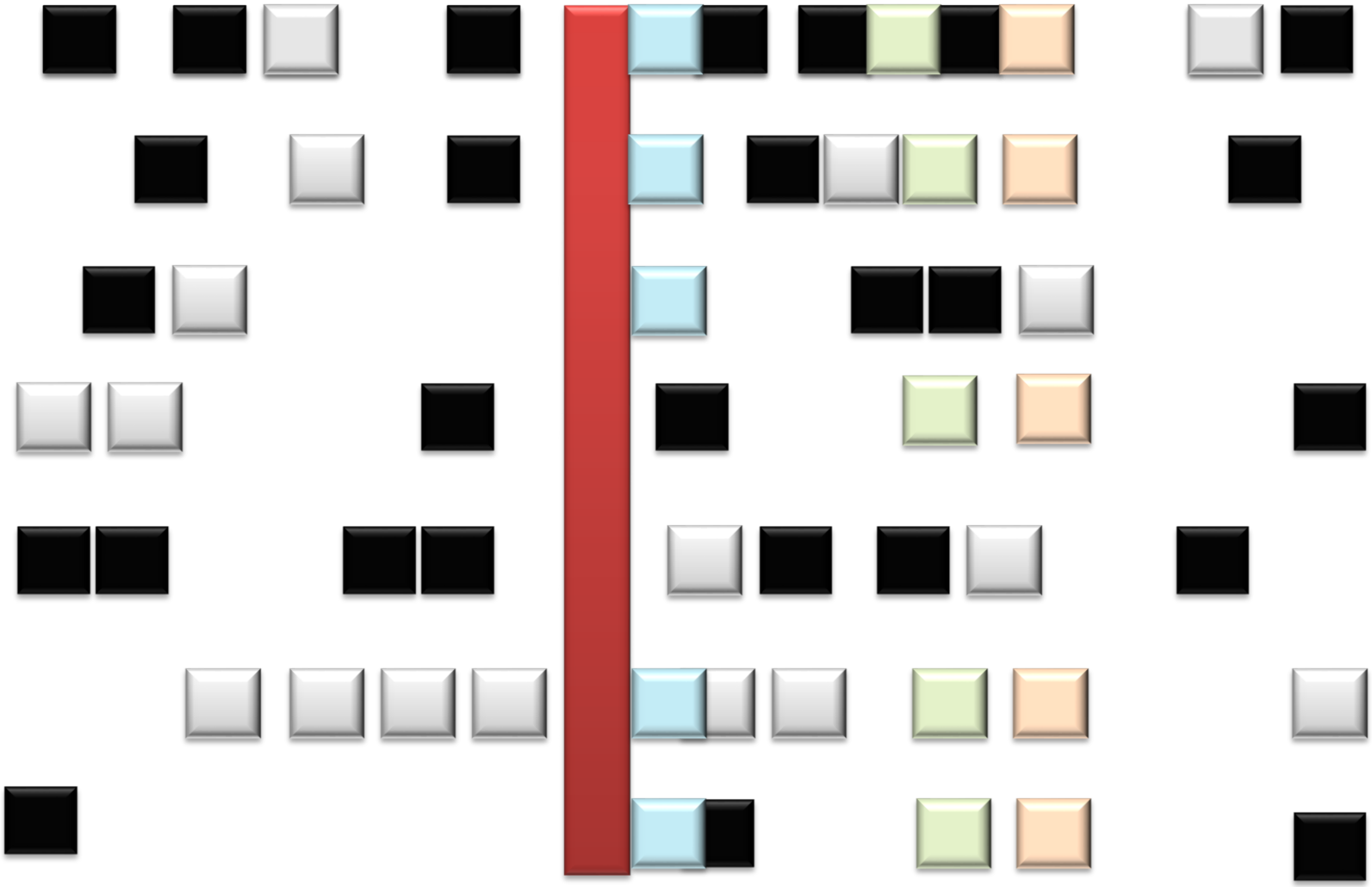
Gale CP. Heart. 2012 Jul;98(14):1040-3



Gale CP. Heart. 2012 Jul;98(14):1040-3

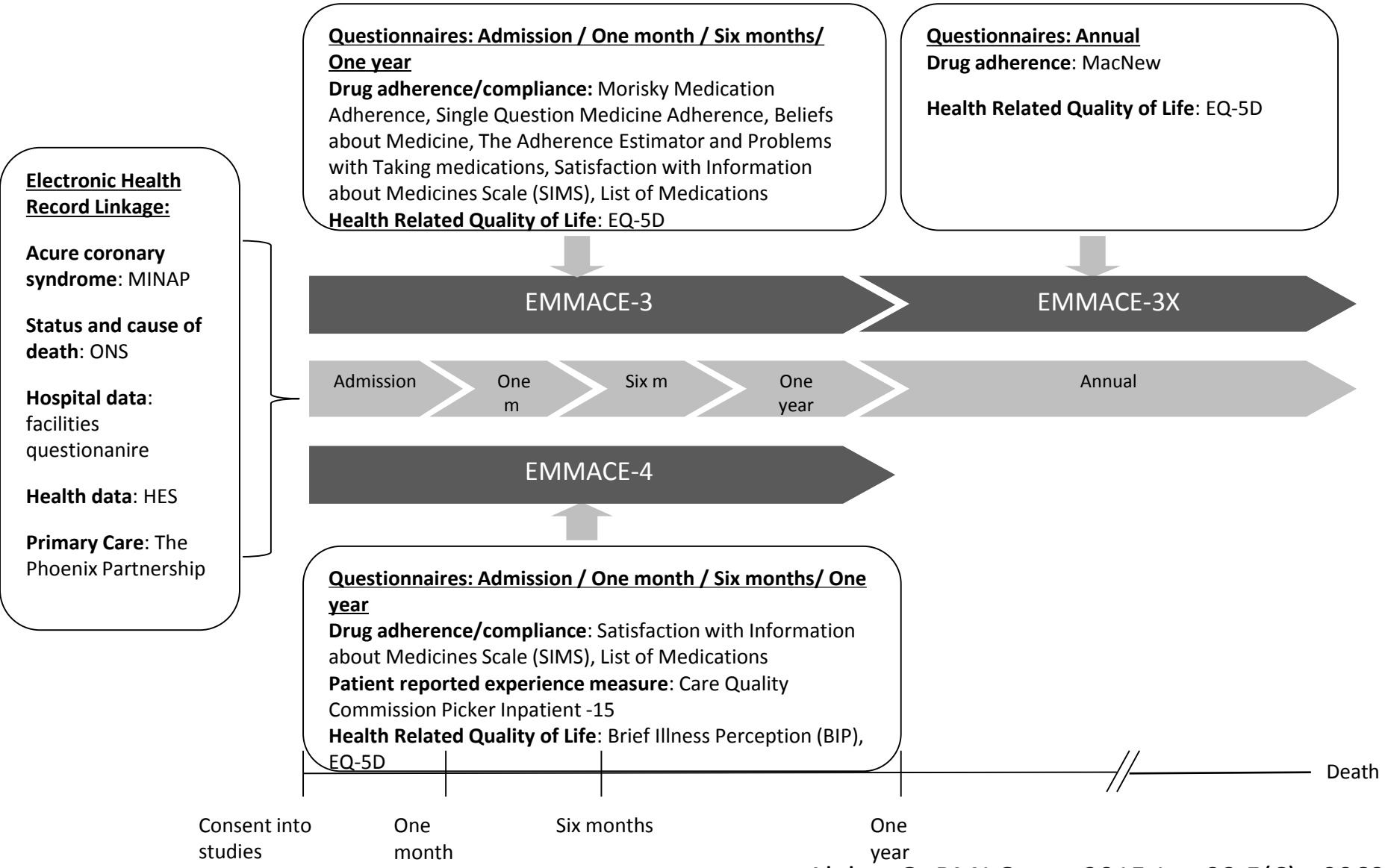


Gale CP. Heart. 2012 Jul;98(14):1040-3



Gale CP. Heart. 2012 Jul;98(14):1040-3

EMMACE: data resolution



Alabas O. BMJ Open. 2015 Jun 23;5(6):e006256

European Heart Journal
doi:10.1093/eurheartj/ehr381

CLINICAL RESEARCH

Resolving inequalities in care? Reduced mortality in the elderly after acute coronary syndromes. The Myocardial Ischaemia National Audit Project 2003–2010

Chris P. Gale[1,2*], B.A. Cattle[1], A. Woolston[1], P.D. Baxter[1], T.H. West[1], A.D. Simms[1], J. Blaxill[3], D.C. Greenwood[1], K.A.A. Fox[4], and R.M. West[1]

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Heart attack death rates almost halved

DEATH rates for heart attack patients while in hospital have almost halved, researchers from Leeds have found.

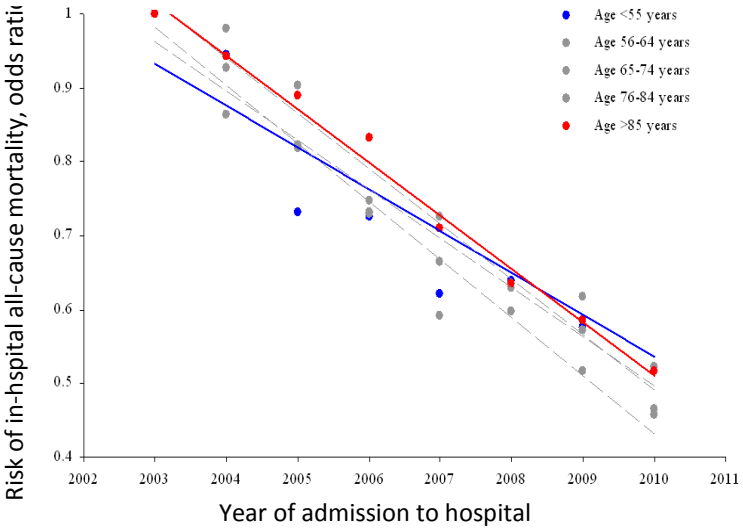
But the team from the University of Leeds discovered differences in how elderly heart attack patients are managed.

The research, carried out by the University of Leeds and funded by the British Heart Foundation (BHF), showed the risk of a heart patient dying in hospital almost halved between 2003 and 2010 and specialist treatments are much more widely available to heart attack patients.

However, patients aged over 85 are less likely to receive specialist care and medicines after discharge from hospital.

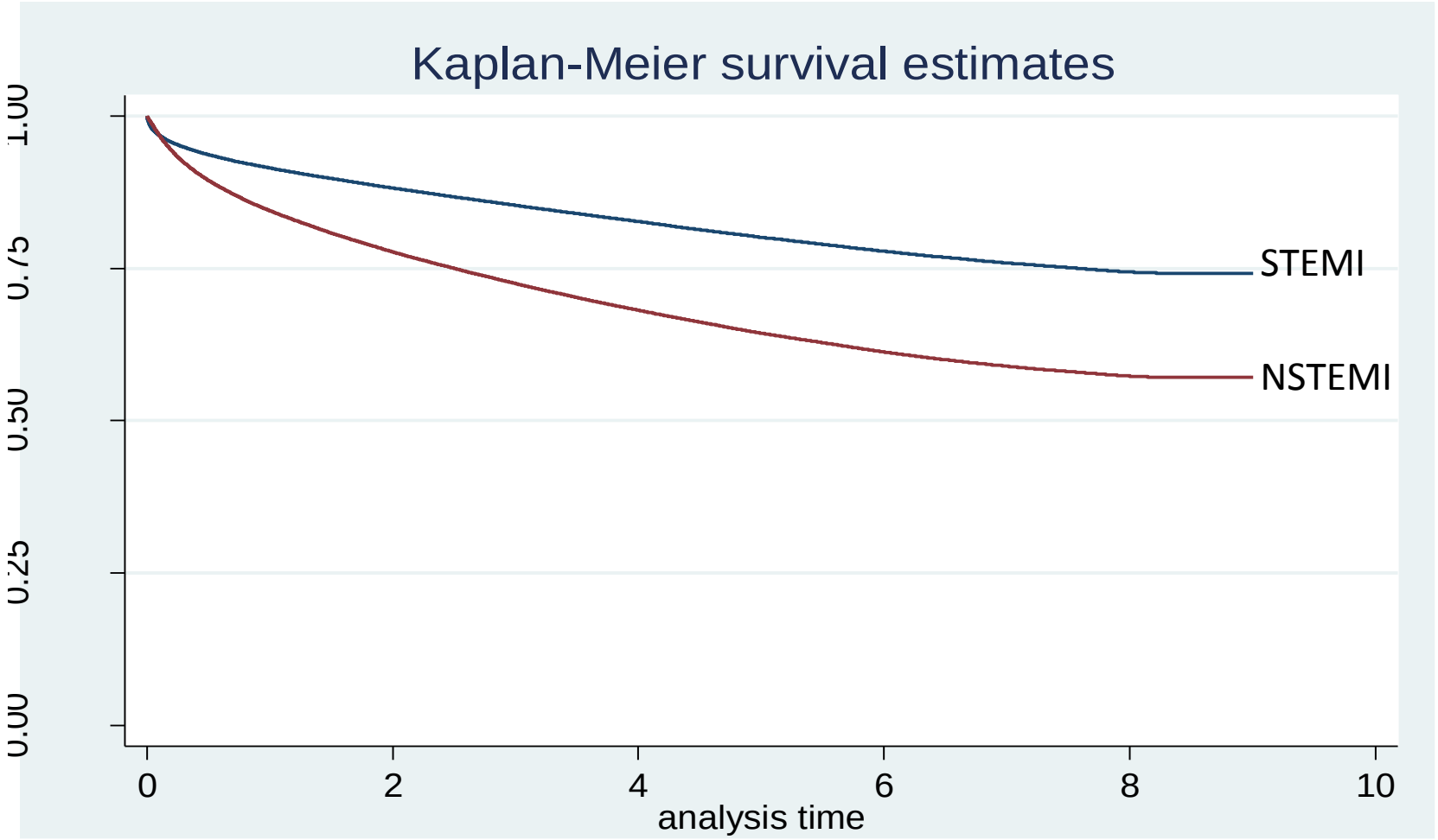
Natasha Stewart, senior cardiac nurse at the BHF, said: "It's wholly unacceptable that elderly heart attack patients do not have equal access to a cardiologist in the UK.

"This reduces their chance of getting early interventions, even though there's evidence they would benefit just as much as younger patients.



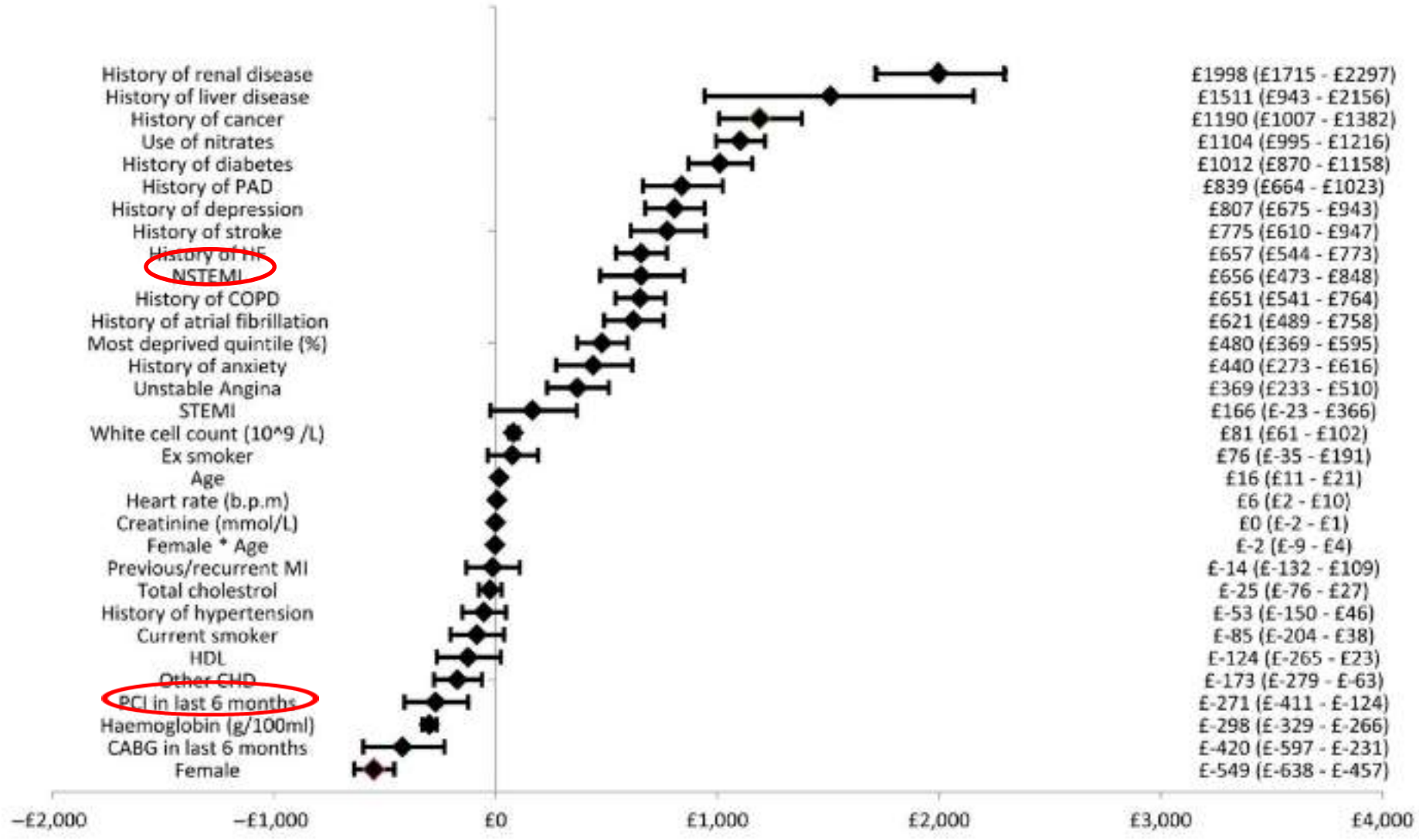
Gale CP. Eur Heart J. 2012 Mar;33(5):630-9

Acute myocardial infarction survivorship



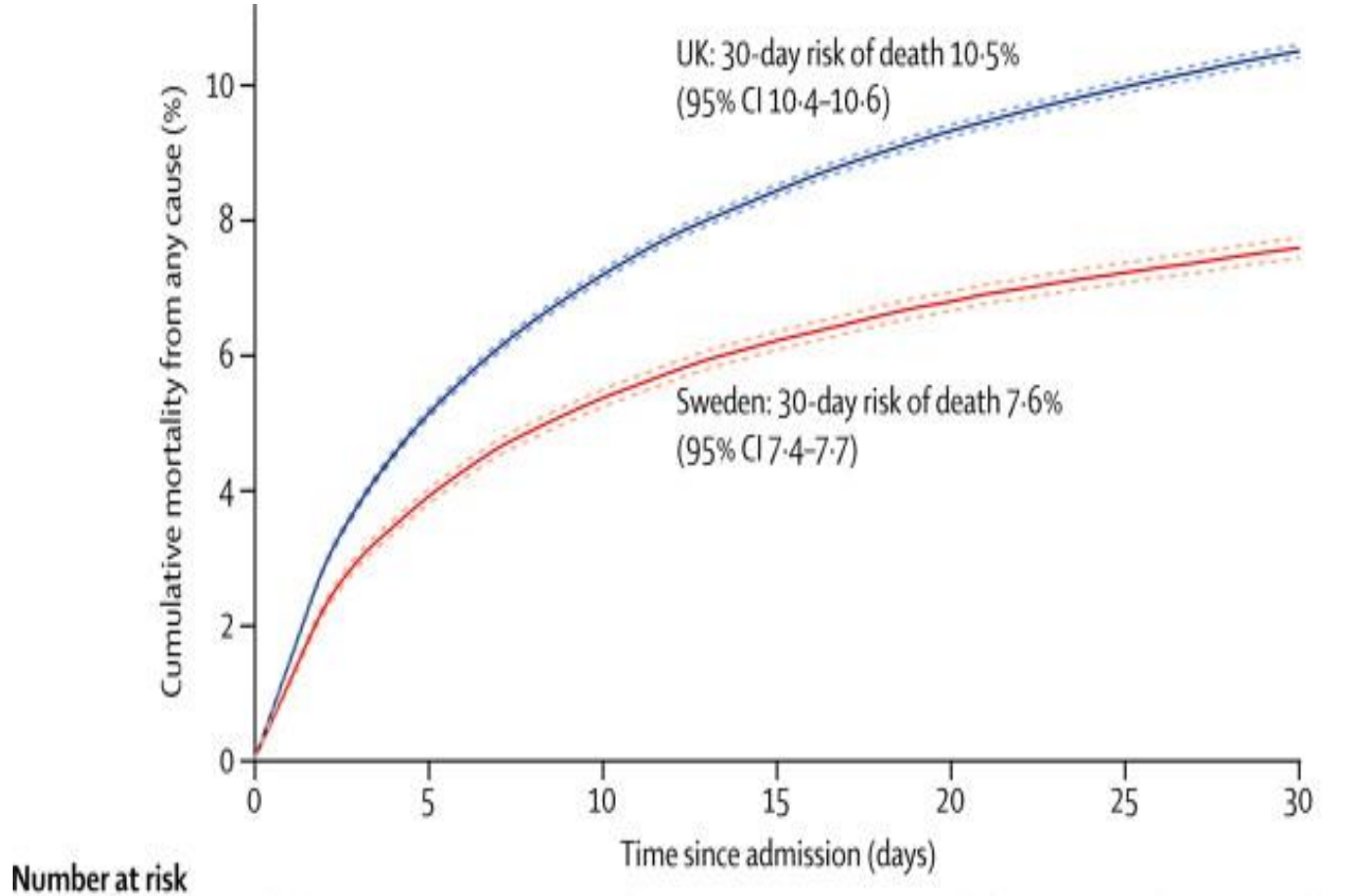
Gale CP. MINAP 2003-2013

Long-term healthcare costs: stable CAD



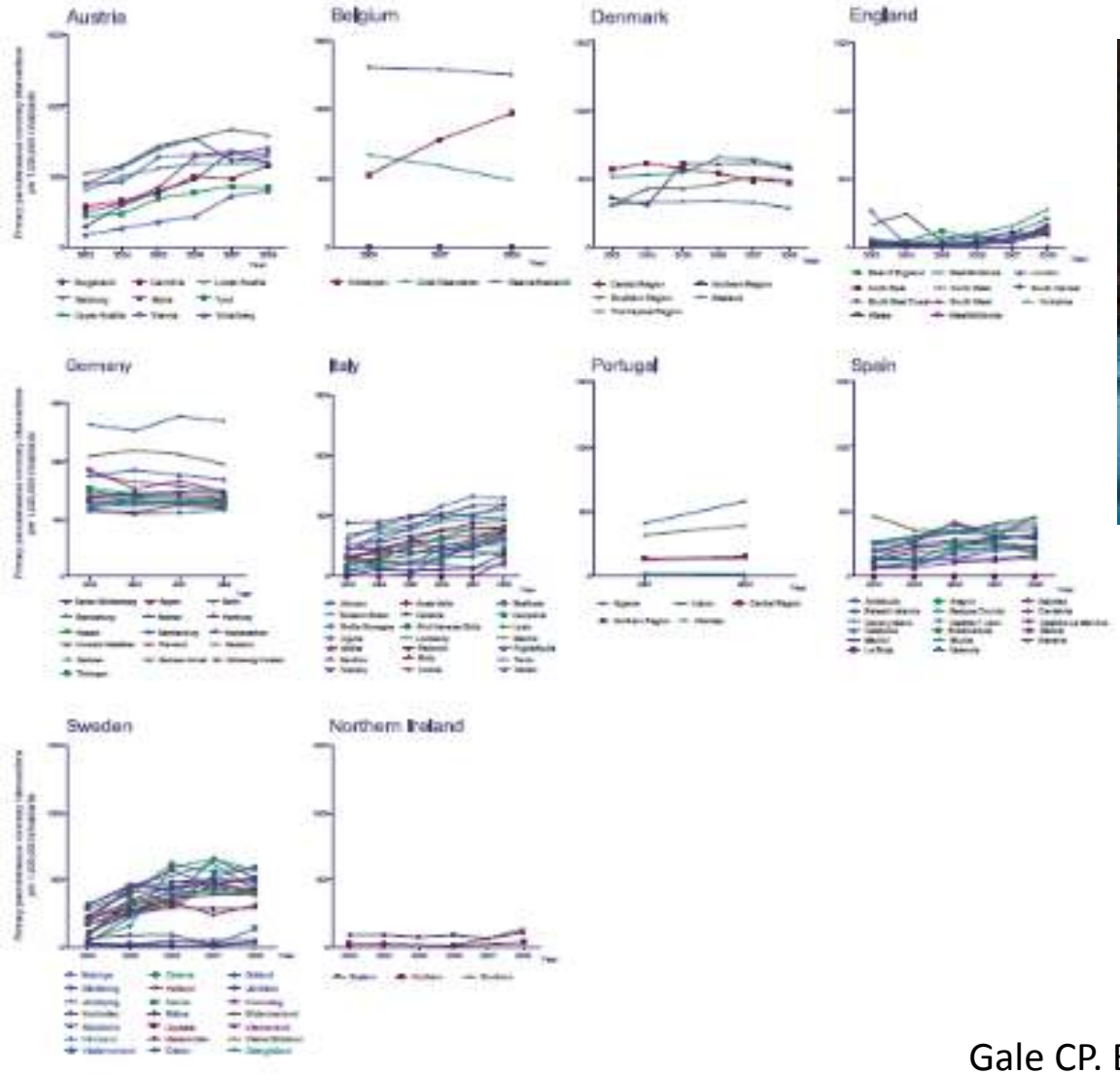
Walker S. EHJ Qual Care Clin Outcomes. 2016:2(2):125-140

Improved survival following AMI in Sweden compared with the UK



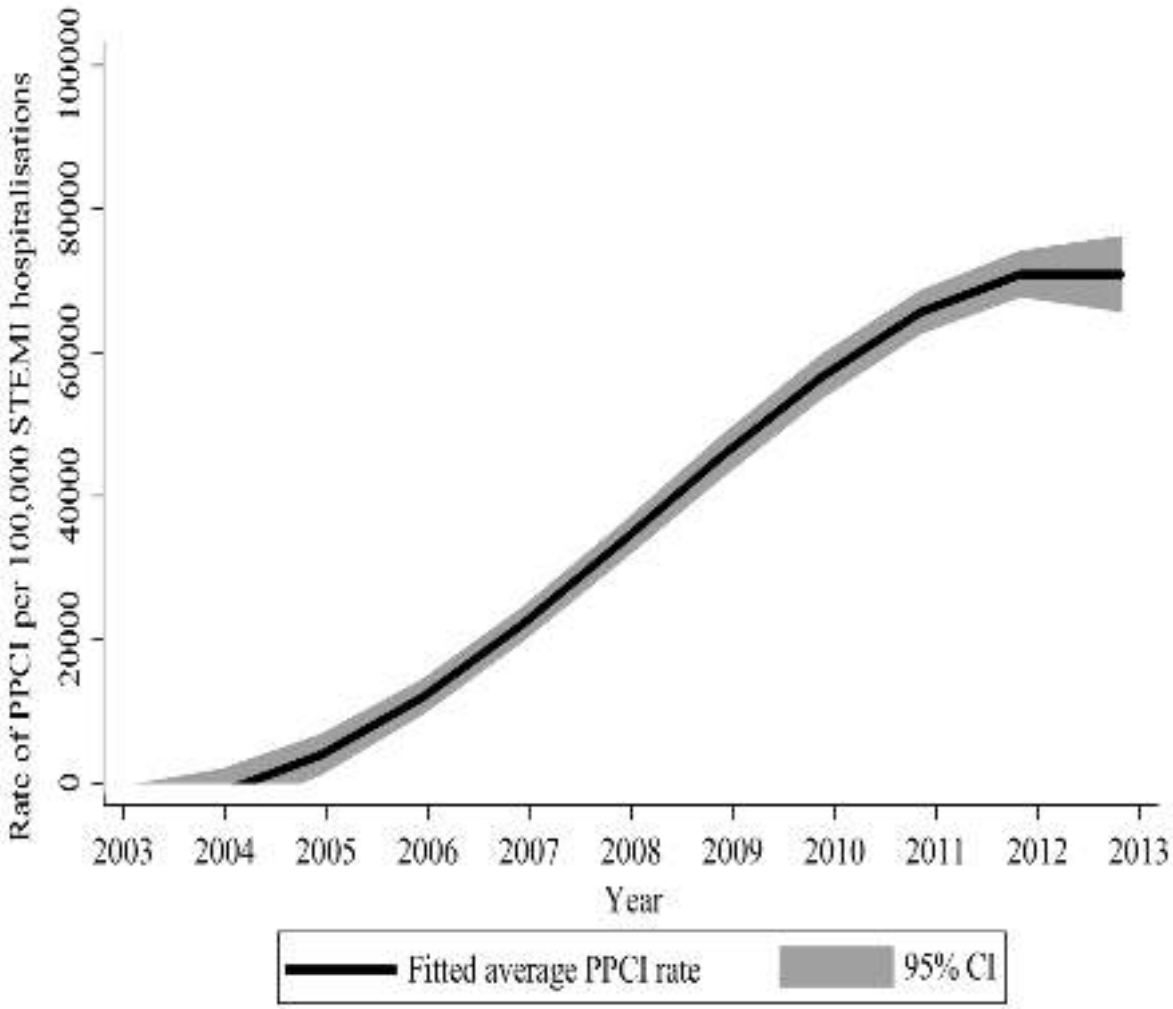
Chung SC. Lancet. 2014 Apr 12;383(9925):1305-12

International missed opportunities



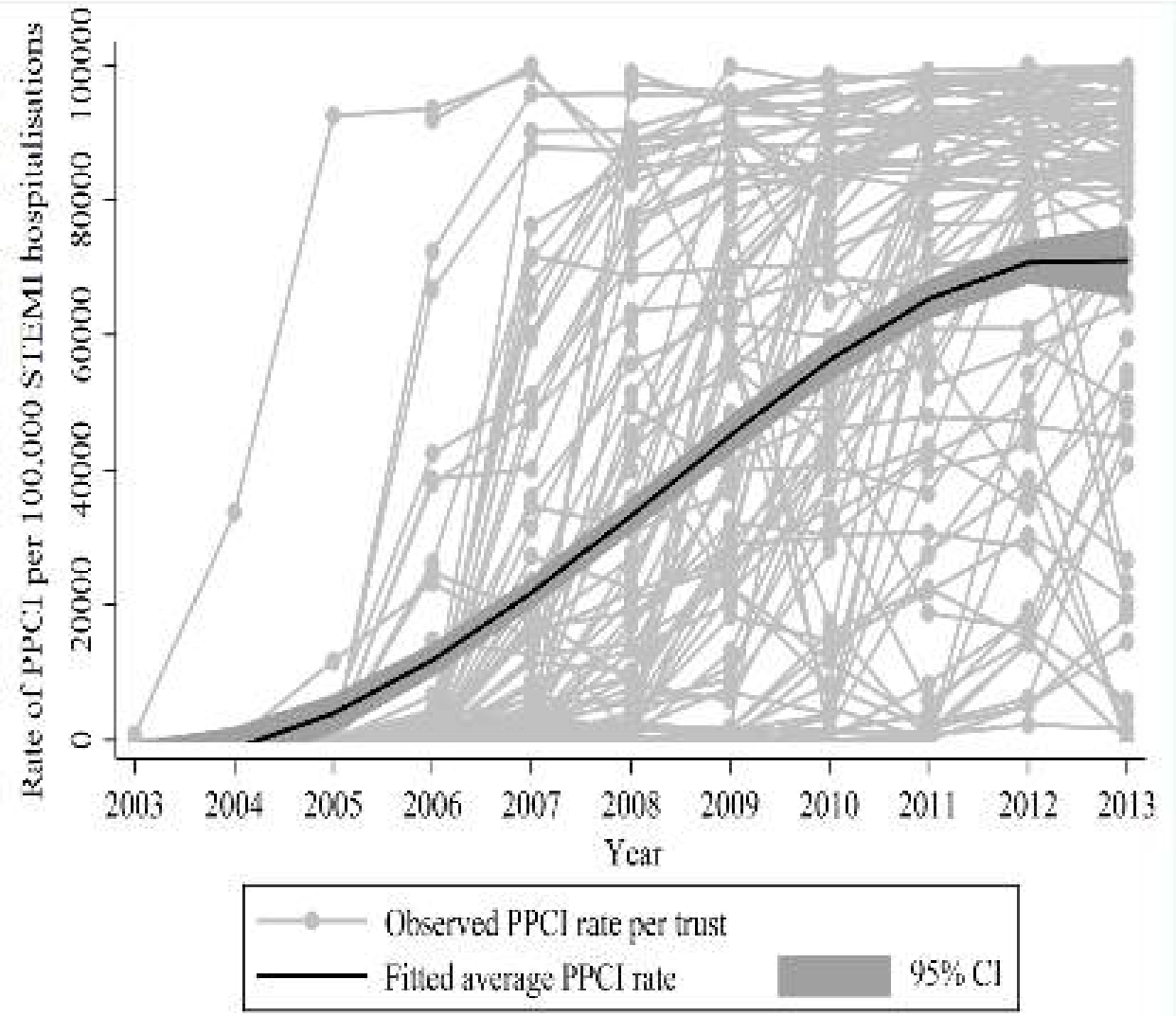
Gale CP. EuroIntervention. 2013;9(4):469-76
Gale CP. Int J Cardiol. 2013 Oct 3;168(3):2745-53

PPCI diffusion, MINAP 2003-2013



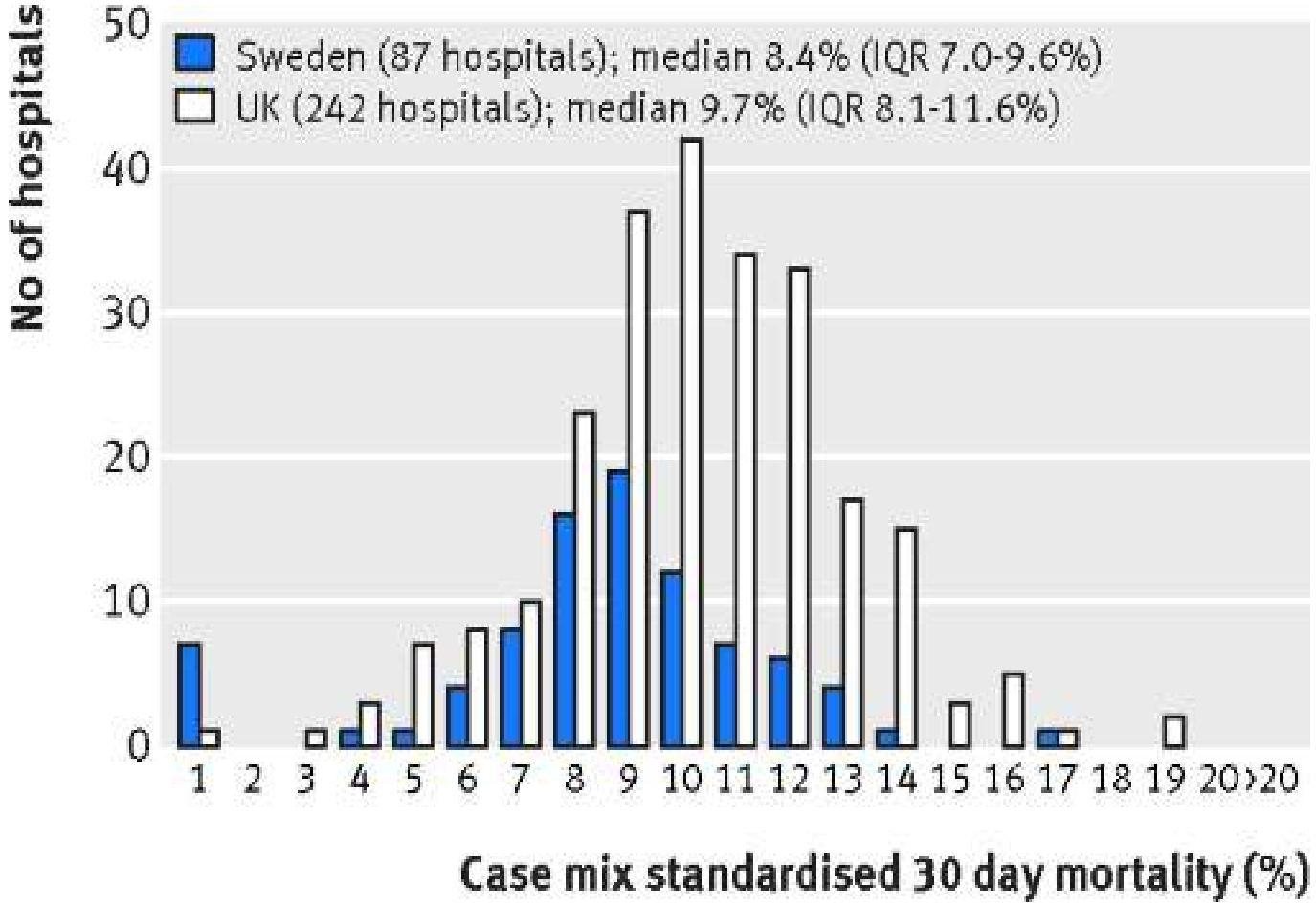
Hall M. Heart 2016, Jan 5 pii: heartjnl-2015-308616

PPCI diffusion, MINAP 2003-2013



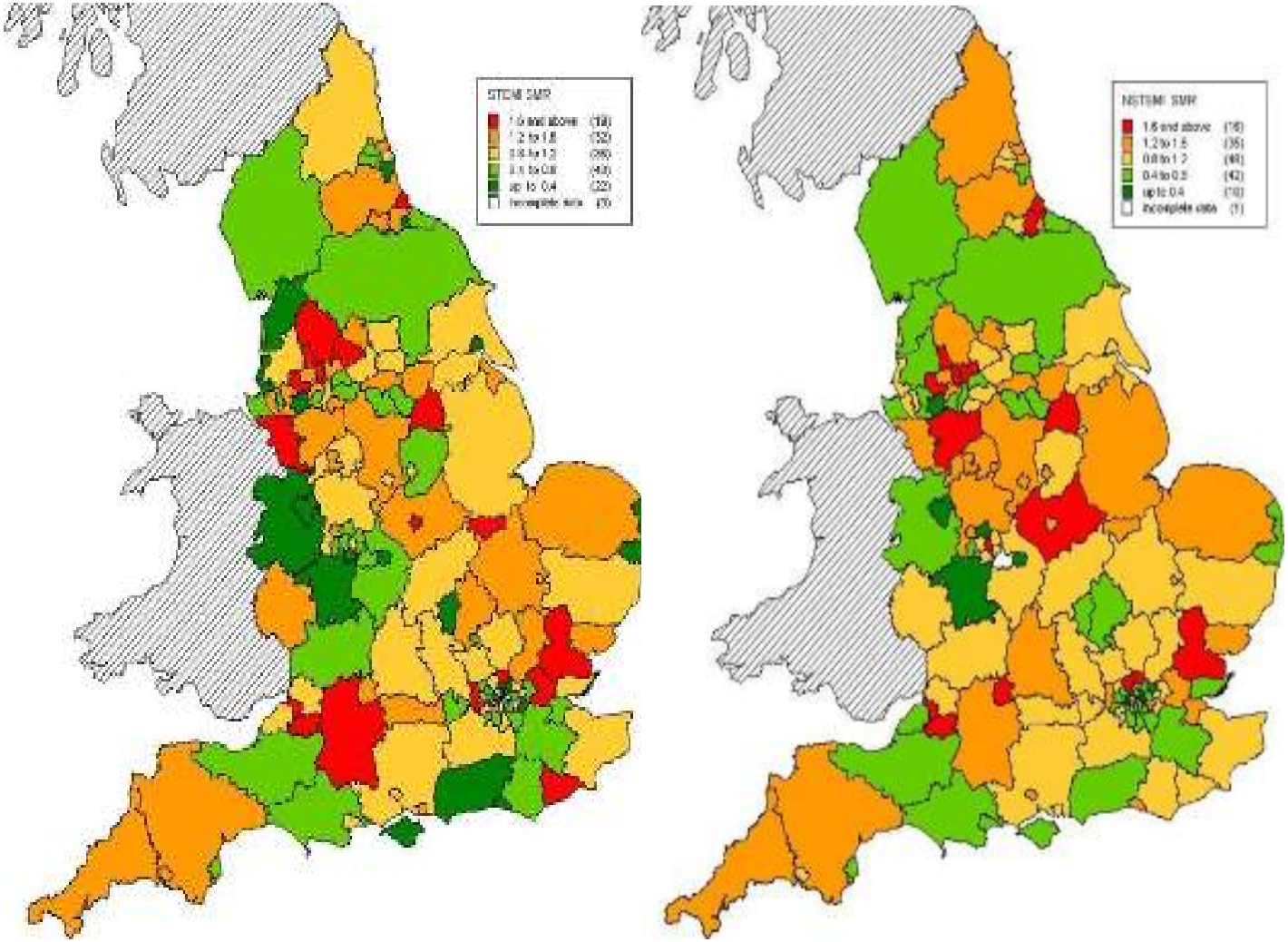
Hall M. Heart 2016, Jan 5 pii: heartjnl-2015-308616

Hospital variation in case mix standardised 30 day mortality (%) in Sweden and UK, 2004-10



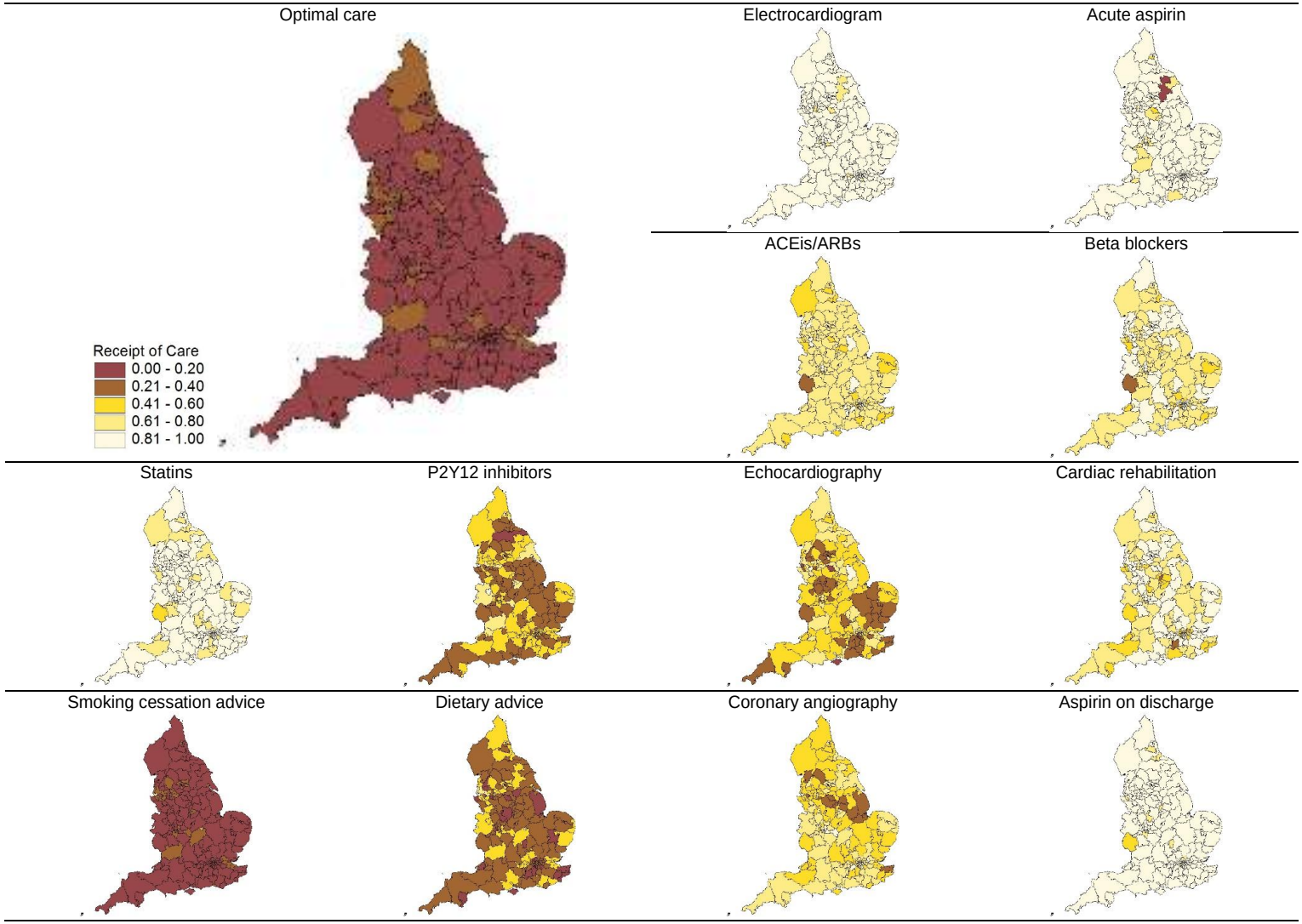
Chung SC. BMJ 2015;351:bmj.h3913

Regional inequalities



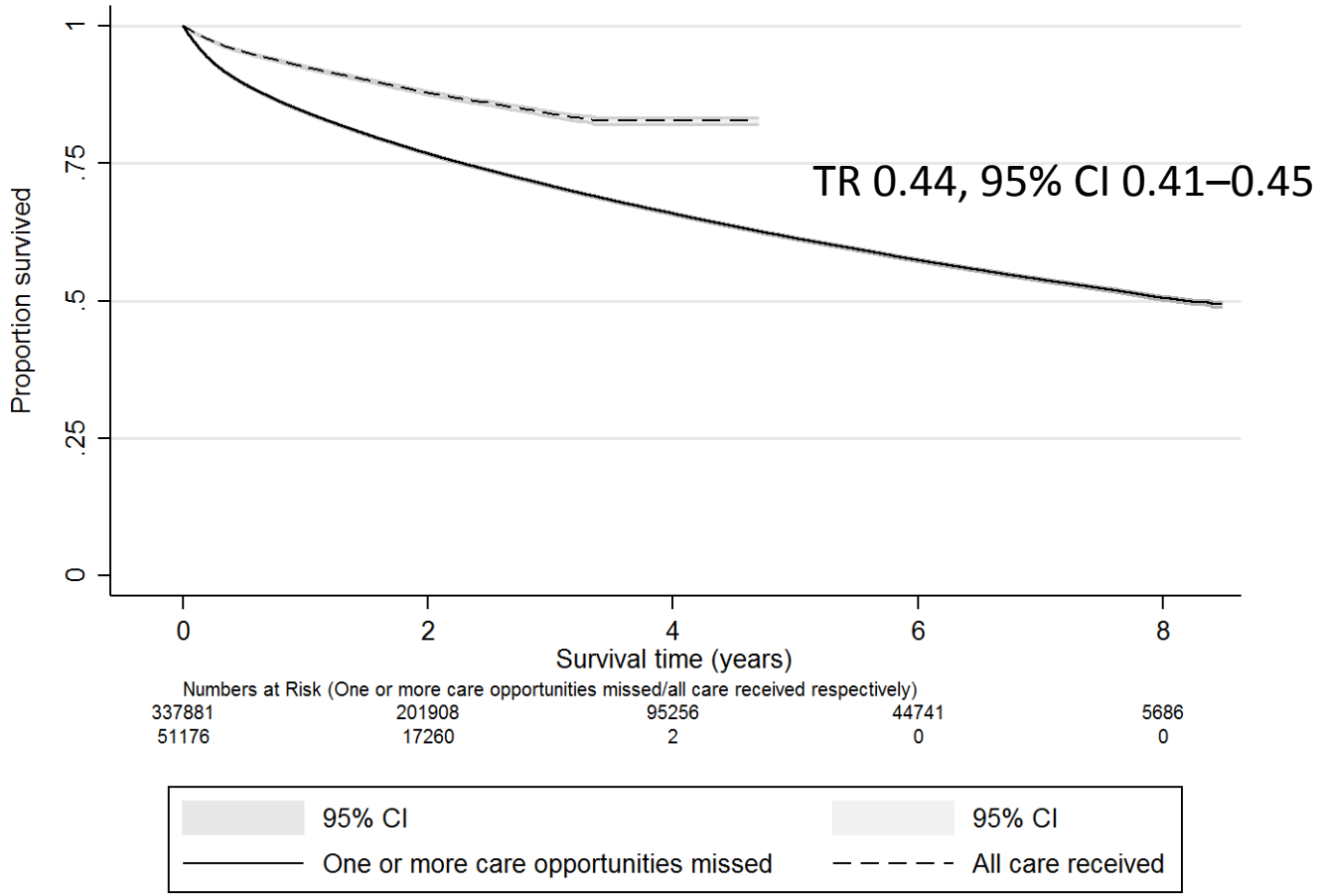
Gale CP. Heart. 2011 Dec;97(23):1926-31

Geographic variation in guideline-indicated care for NSTEMI, 2003-2013, CCG



Dondo TB. BMJ Open 2016;6:e011600.

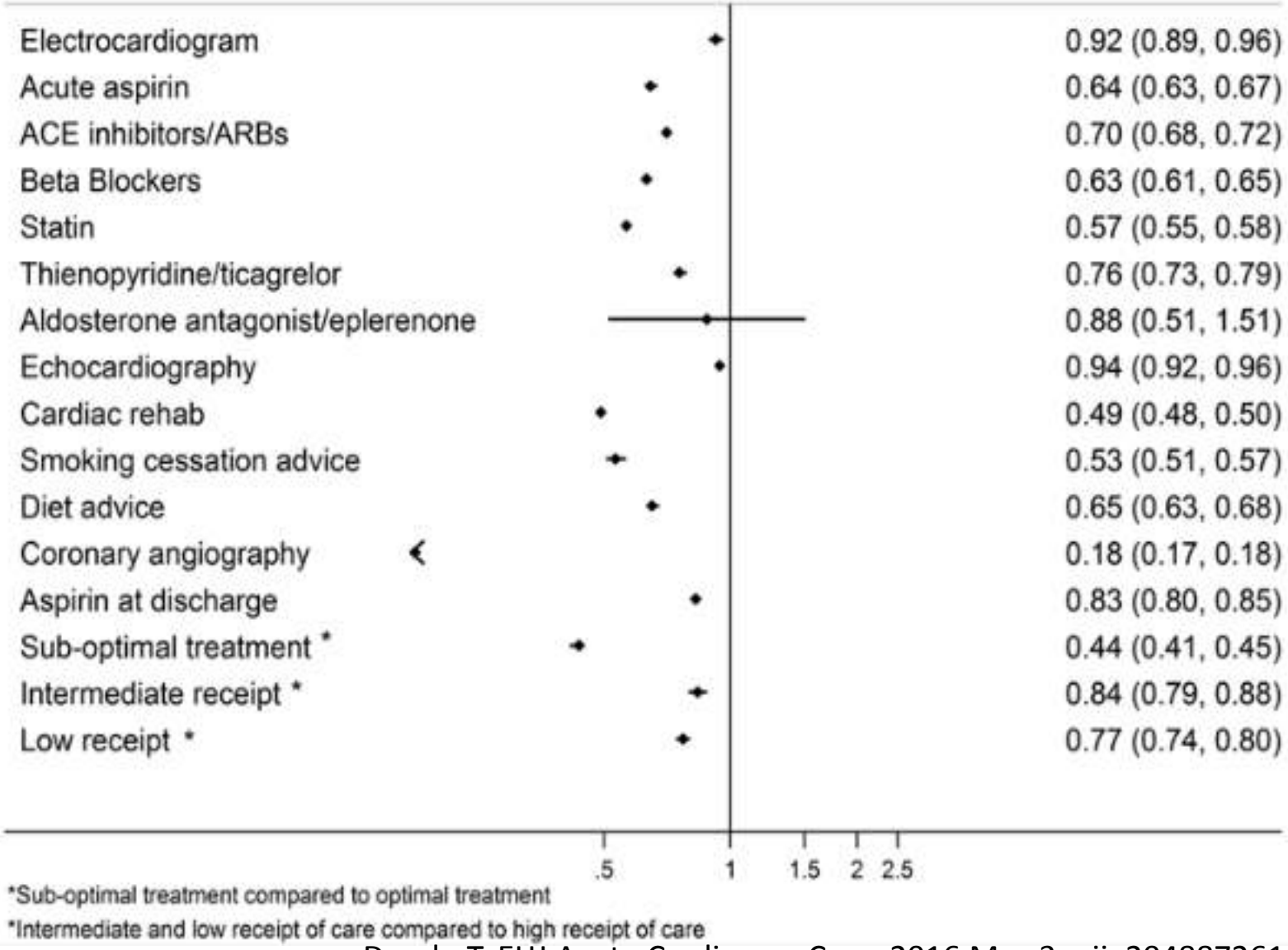
Reduced survival among NSTEMI who do not receive eligible care



After adjustment, time to death among patients who did not receive ≥1 intervention was shortened by 56%

Dondo T. EHJ Acute Cardiovasc Care. 2016 May 3. pii: 2048872616647705

Impact of care opportunities

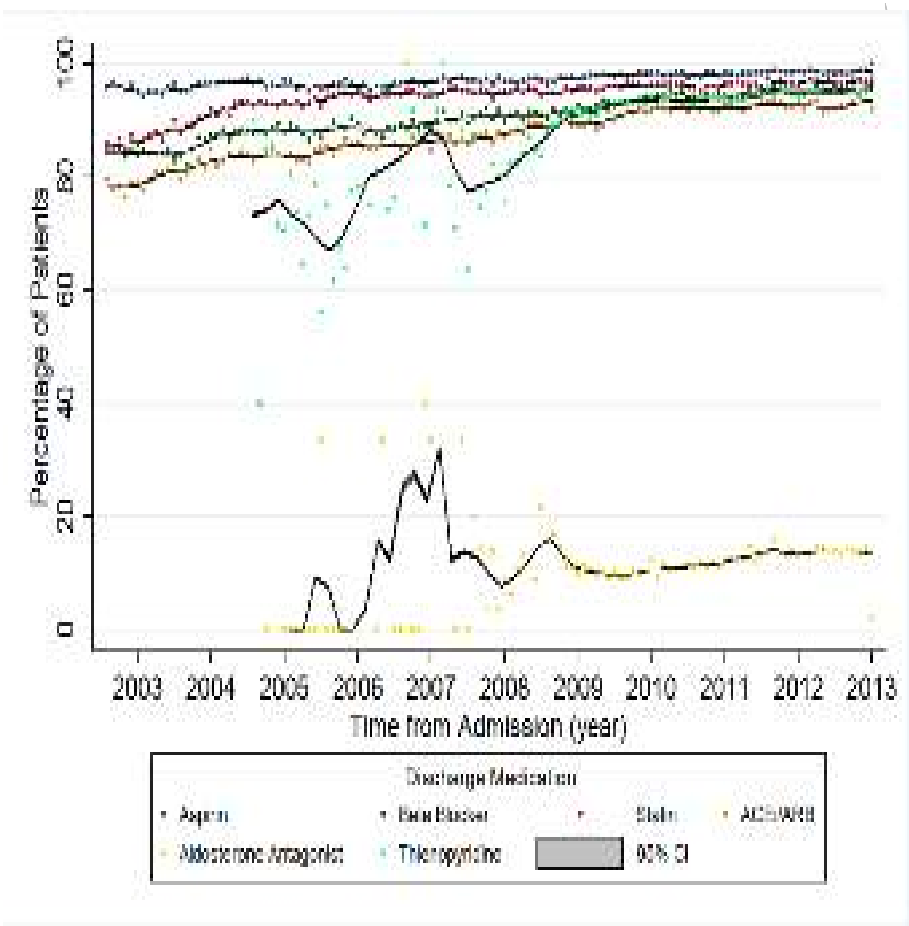


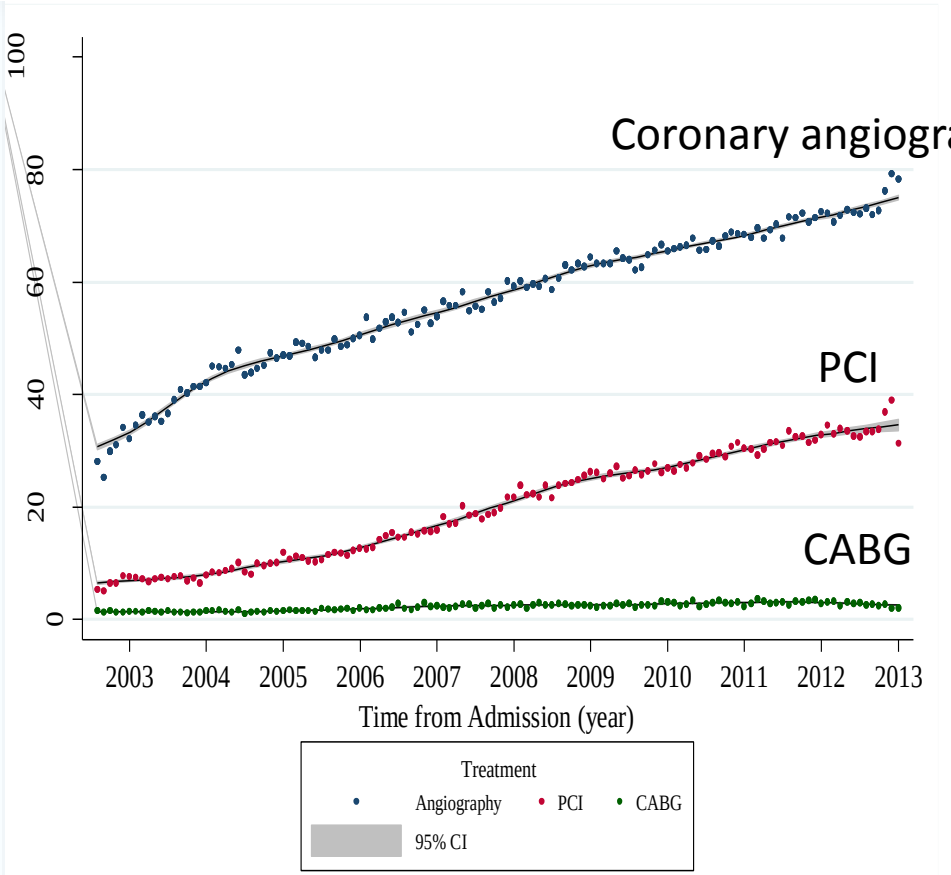
*Sub-optimal treatment compared to optimal treatment

*Intermediate and low receipt of care compared to high receipt of care

Dondo T. EHJ Acute Cardiovasc Care. 2016 May 3. pii: 2048872616647705

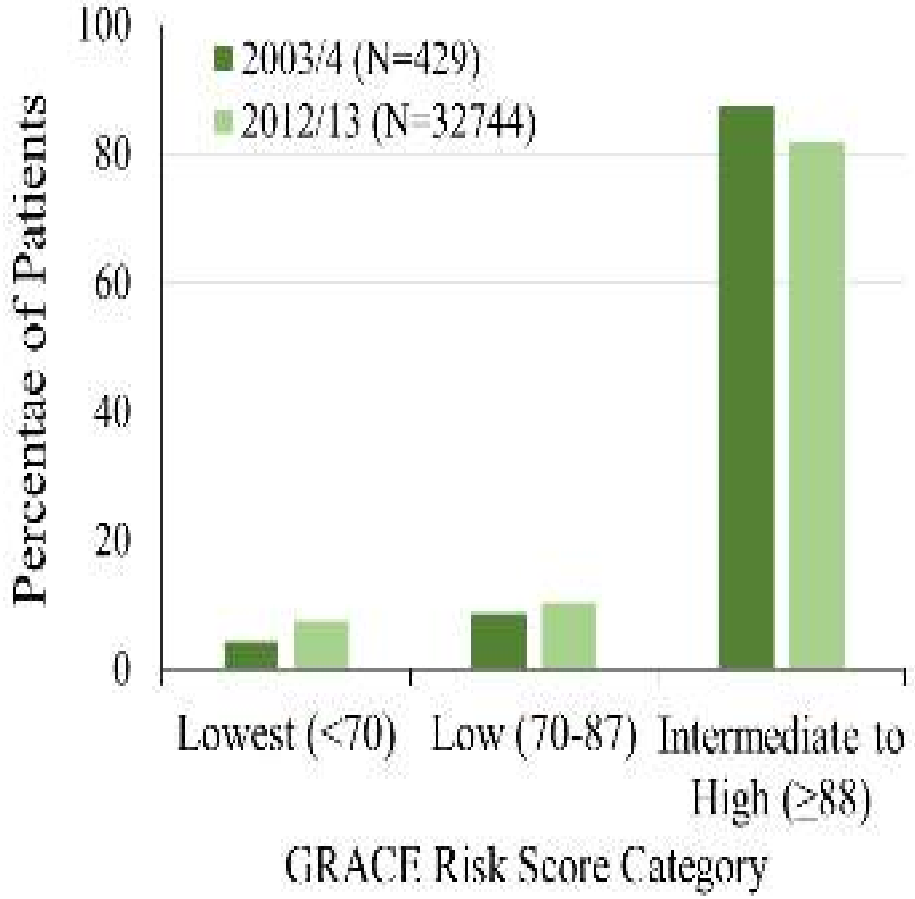
Temporal improvements in use of guideline-indicated treatments





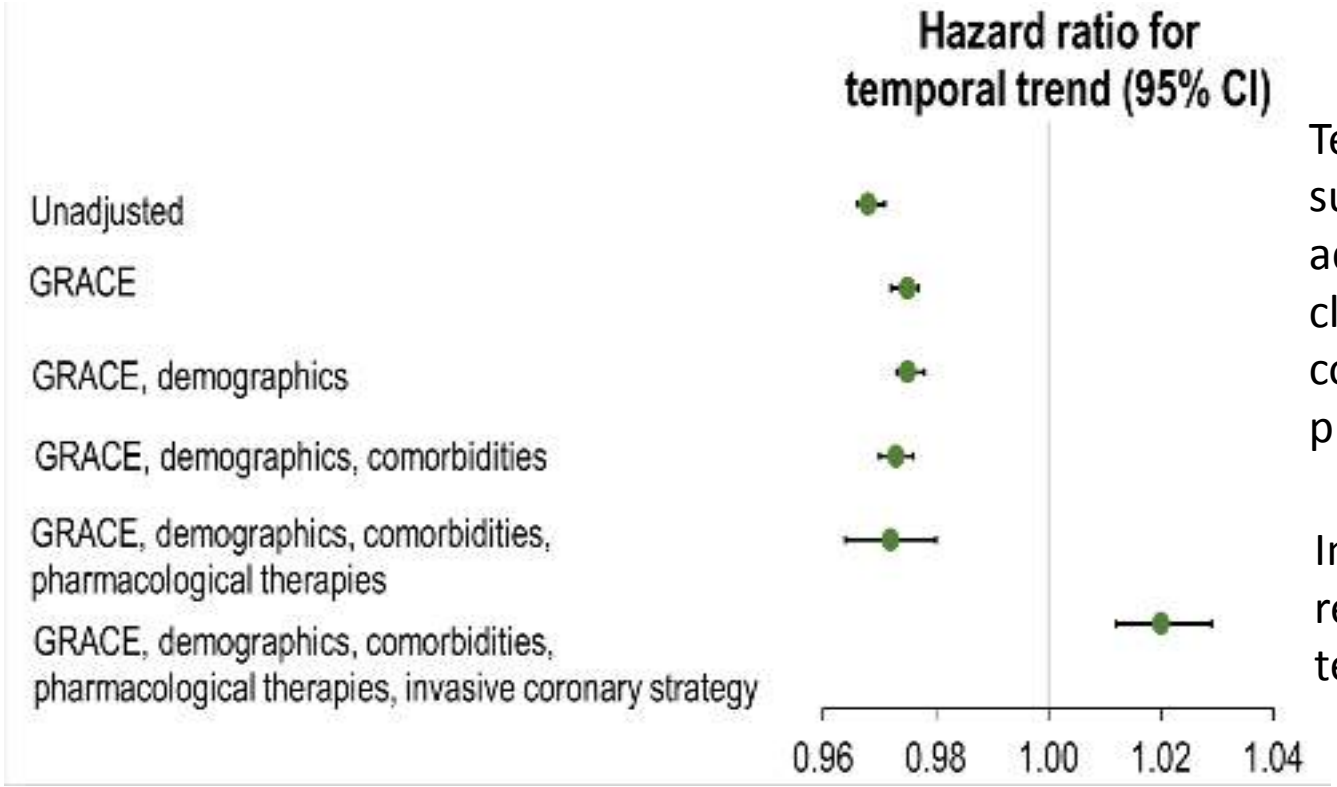
Hall M. JAMA. 2016 Sep 13;316(10):1073-1082

Decrease in higher and increase in lower GRACE risk score, 2003-2013



Hall M. JAMA. 2016 Sep 13;316(10):1073-1082

Invasive coronary strategy explained temporal survival improvements



Temporal improvements in survival remain even after additive adjustment for clinical risk, demographics, co-morbidities and pharmacological therapies

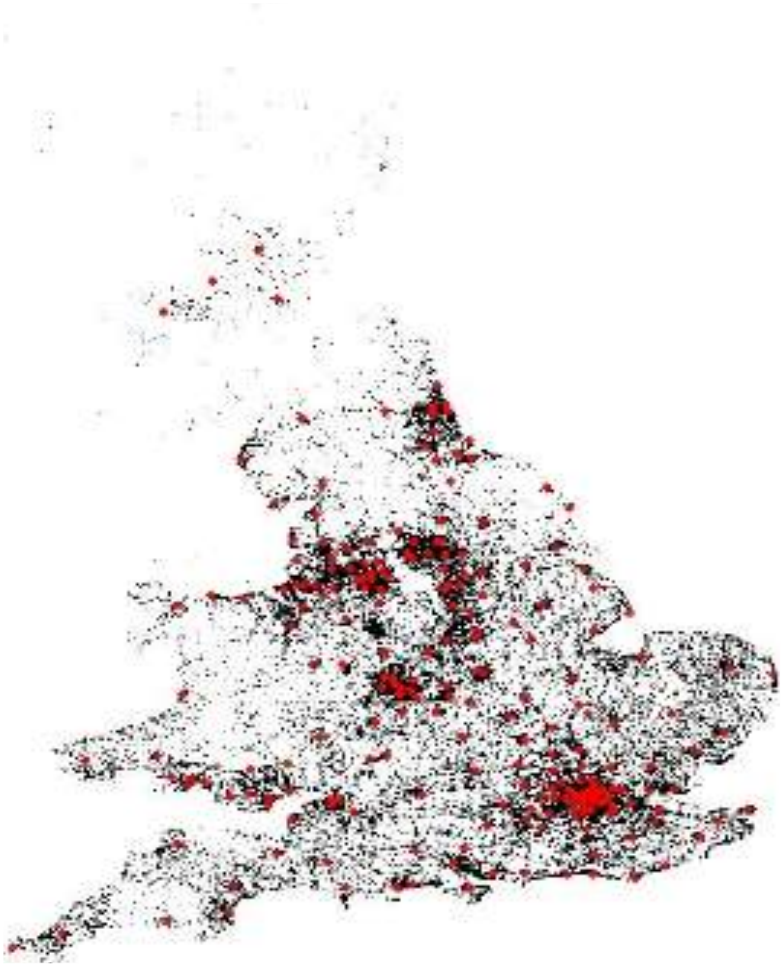
Invasive coronary strategy reversed the direction of the temporal survival effects

Hall M. JAMA. 2016 Sep 13;316(10):1073-1082

Cardiovascular big data knowledge engineering and transfer

Standardisation

User feedback

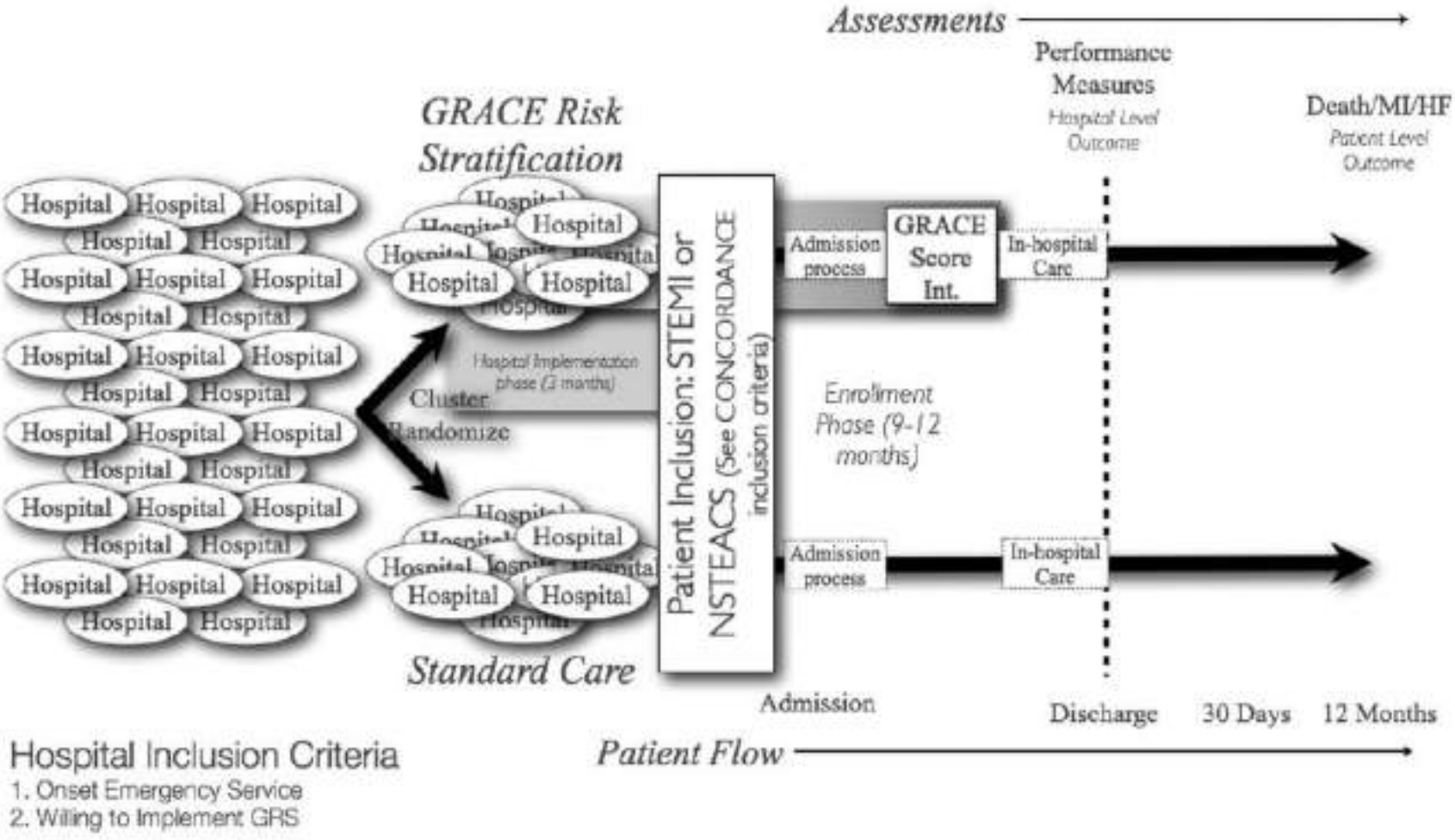


Registry based trials

Re-phenotyping

Scheile F. EHJ Acute Cardiovasc Care. 2016 Aug 29. pii: 2048872616643053

Nationwide registry-based RCT



Cluster randomized design of GRACE risk score versus standard care study schematic.

Chew DP. Am Heart J 2015;170:995-1004.e1.

Cardiovascular landscaping

https://seed.leeds.ac.uk/licamm_vis/Assets/videov3.html

Summary

- Embracing cardiovascular bioinformatics data is a necessary next step in the fight against heart disease

- It will allow:
  - A greater understanding of **societal priorities** for the prevention and treatment of heart attack
  - The **efficient use of data** to test interventions
  - **Enhanced tracking** of the cardiovascular life courses
  - **Attributable effects** analysis – exposomes vs genomes
  - **Precision medicine**

#datasavelives

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