la statistica per valutare e programmare a livello locale

Numeri per decidere

novembre 2016/ febbraio 2017

Incontri con

Dipartimento di Scienze statistiche dell'Università di Bologna

Regione Emilia-Romagna

12 dicembre 2016

15.30–18.00

Indicatori, valutazione delle performance, sistemi sanitari e big data: può la statistica influenzare (e migliorare) le politiche sociali?

Fabrizio Carinci
Professor of Health Systems and Policy
School of Health Sciences, University of Surrey
f.carinci@surrey.ac.uk

UNIVERSITY OF SURREY 4TH BEST UNIVERSITY IN THE UK GUARDIAN LEAGUE TABLE 2016 Athena SWAN Bronze Award

Argomenti

1. Perchè valutare la Performance dei sistemi sanitari?
2. Perchè c'è bisogno delle Scienze Statistiche?
3. Che si sfide si aprono con i “Big Data”?
4. Quale futuro per le Statistiche della Salute?

Argomenti

1. **Perchè valutare la Performance dei sistemi sanitari?**
2. Perchè c'è bisogno delle Scienze Statistiche?
3. Che si sfide si aprono con i “Big Data”?
4. Quale futuro per le Statistiche della Salute?

Spreco in sanità

DECREASE WASTE AND INCREASE EFFICIENCY

Money should not be spent on unnecessary administration, inefficiencies, and care that doesn't improve health.

IN HEALTH CARE...

1/3

of health care expenditures—an estimated $750 billion!—don't improve health.

IN OTHER INDUSTRIES...

FACTORY ASSEMBLY LINES are continually monitored to improve quality, identify inefficiencies, and remove waste.

IOM (Institute of Medicine). 2012. Best care at lower cost: The path to continuously learning health care in America.

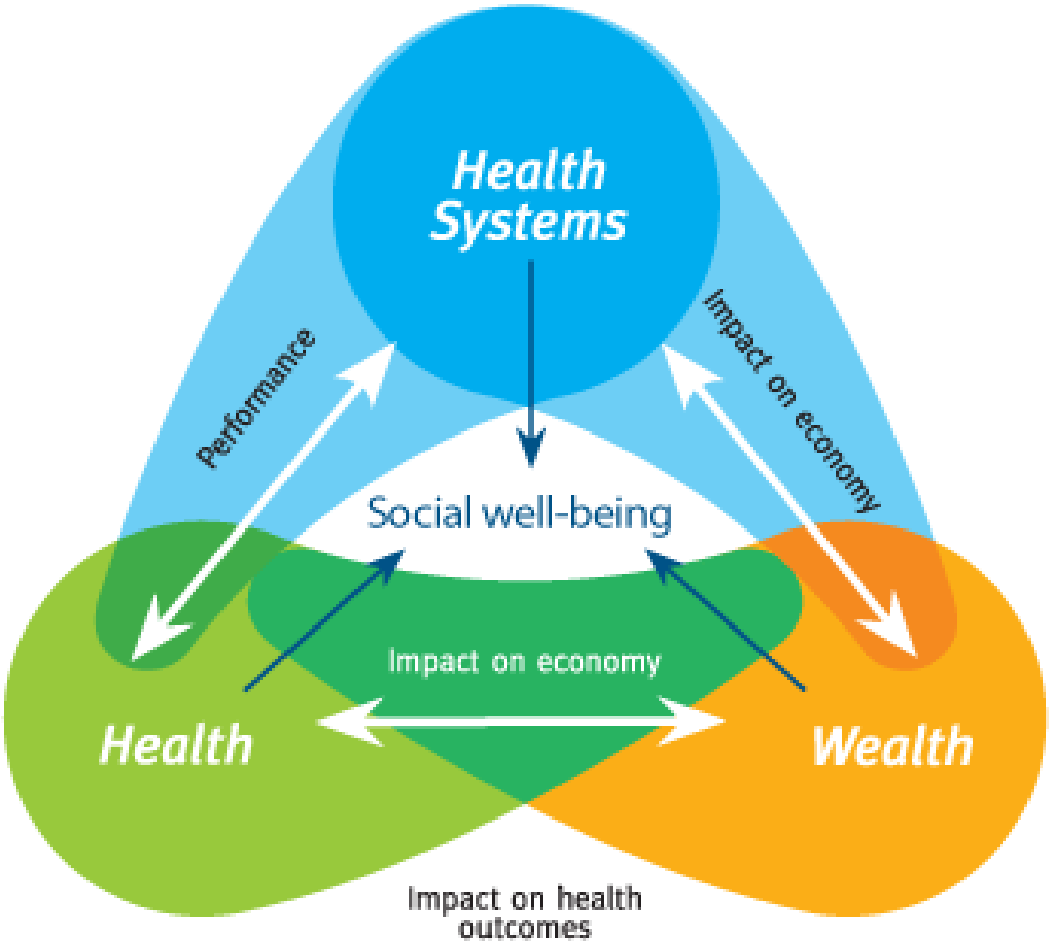
Know-do gap

Quello che si fa

Fabrizio Carinci
UNIVERSITY OF SURREY

WHO European Ministerial Conference on Health Systems

Tallinn, Estonia 25-27 June 2008



Fabrizio Carinci
UNIVERSITY OF SURREY

Messaggi chiave della Charter

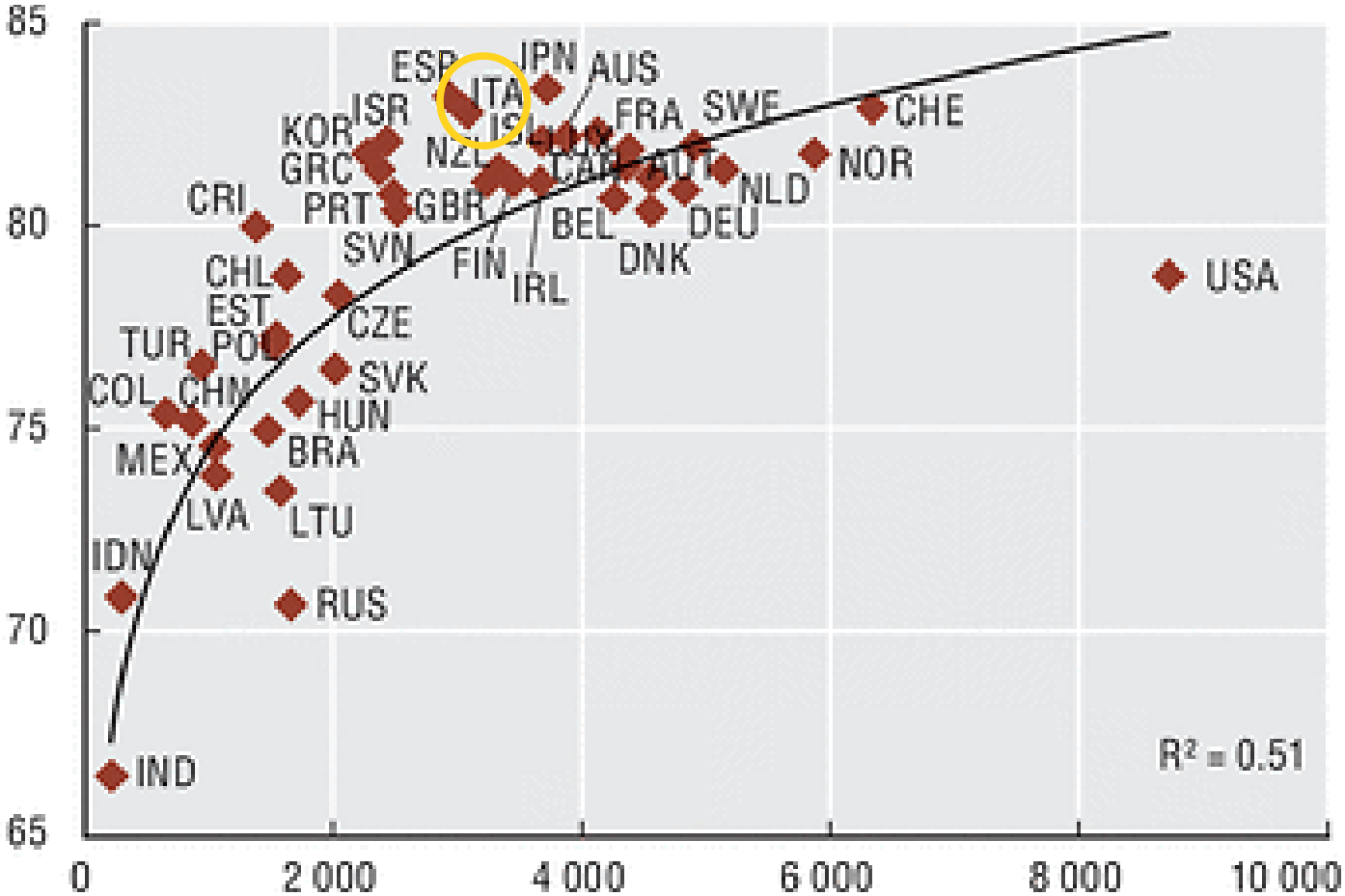
Un sistema sanitario va ben oltre i sistemi di cura. Sistemi sanitari efficaci promuovono contemporaneamente salute e benessere economico: ***oltre i sistemi di cura: sistemi sanitari per la salute ed il benessere economico***

Investire nella salute vuol dire investire nello sviluppo umano futuro: ***investire nella salute, investire nel futuro***

Sistemi sanitari ben funzionanti sono essenziali per ogni società che intenda migliorare e raggiungere l'equità nella salute: ***sistemi sanitari rafforzati salvano più vite***

Relazione tra spesa e salute – Anno 2013

Life Expectancy in years



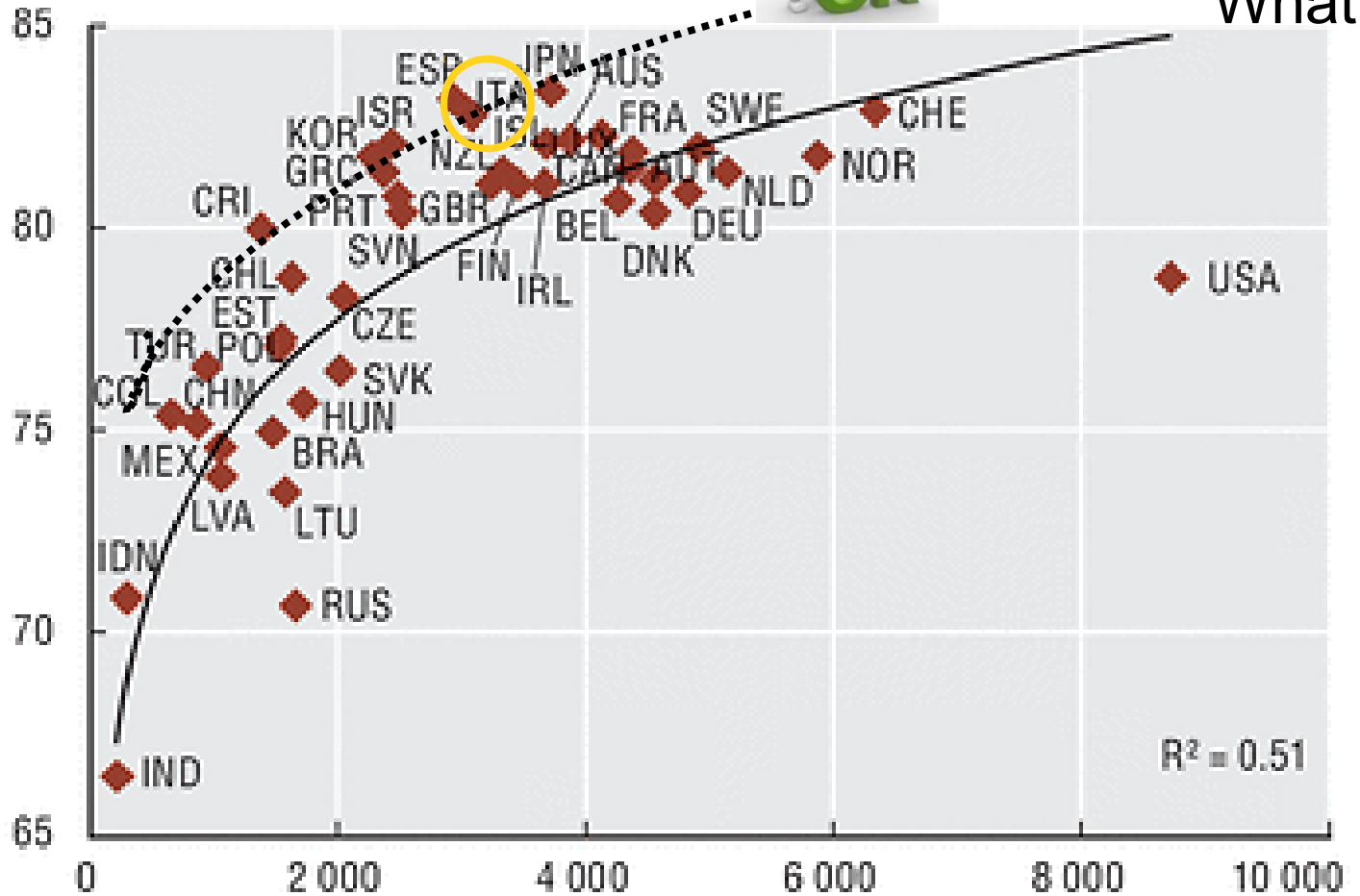
Health spending per capita (USD PPP)

Fabrizio Carinci
UNIVERSITY OF SURREY

Relazione tra spesa e salute – Anno 2013

What if…?

Life Expectancy in years

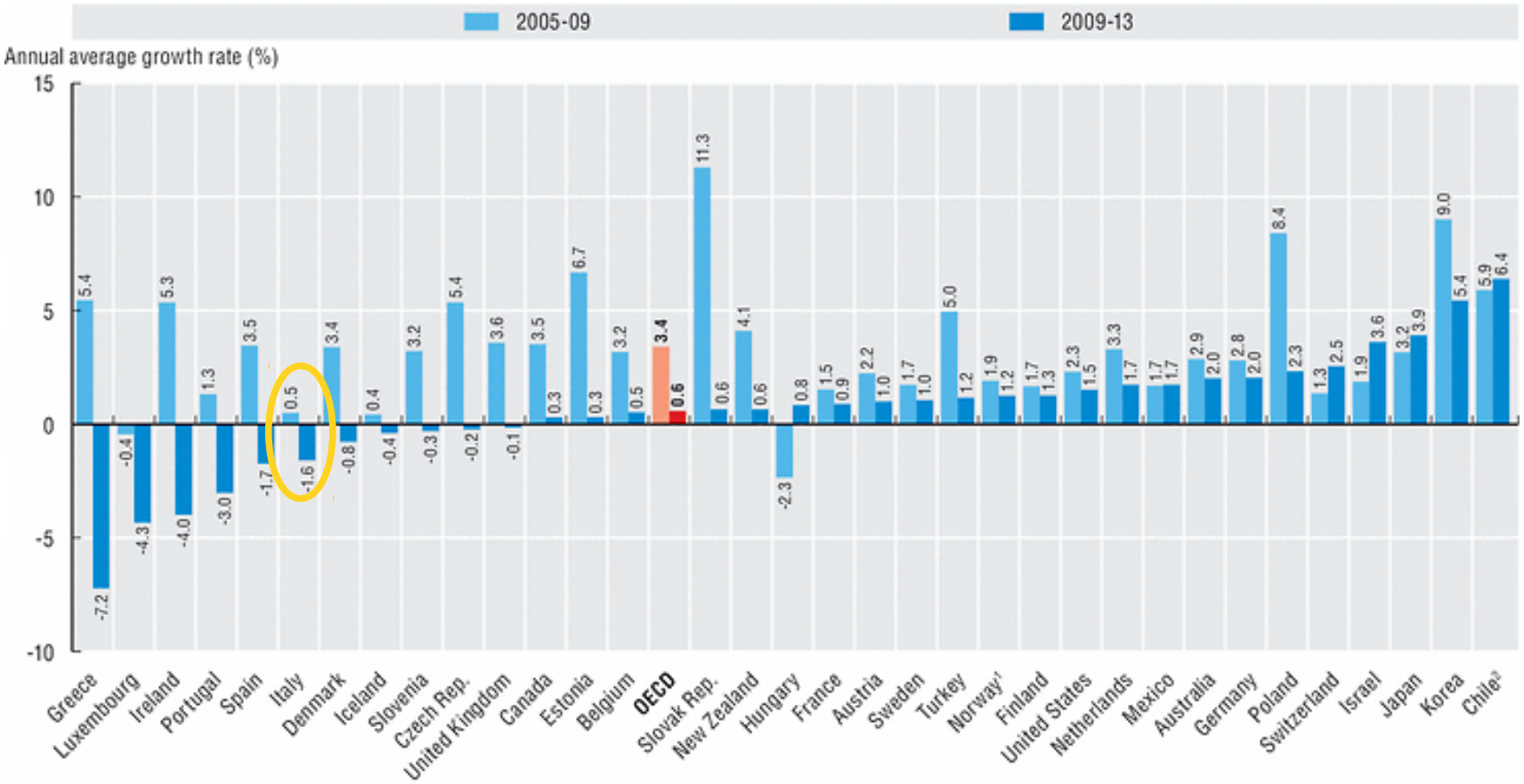


Health spending per capita (USD PPP)

Fabrizio Carinci
UNIVERSITY OF SURREY

Annual average growth rate in per capita health expenditure 2005-2013

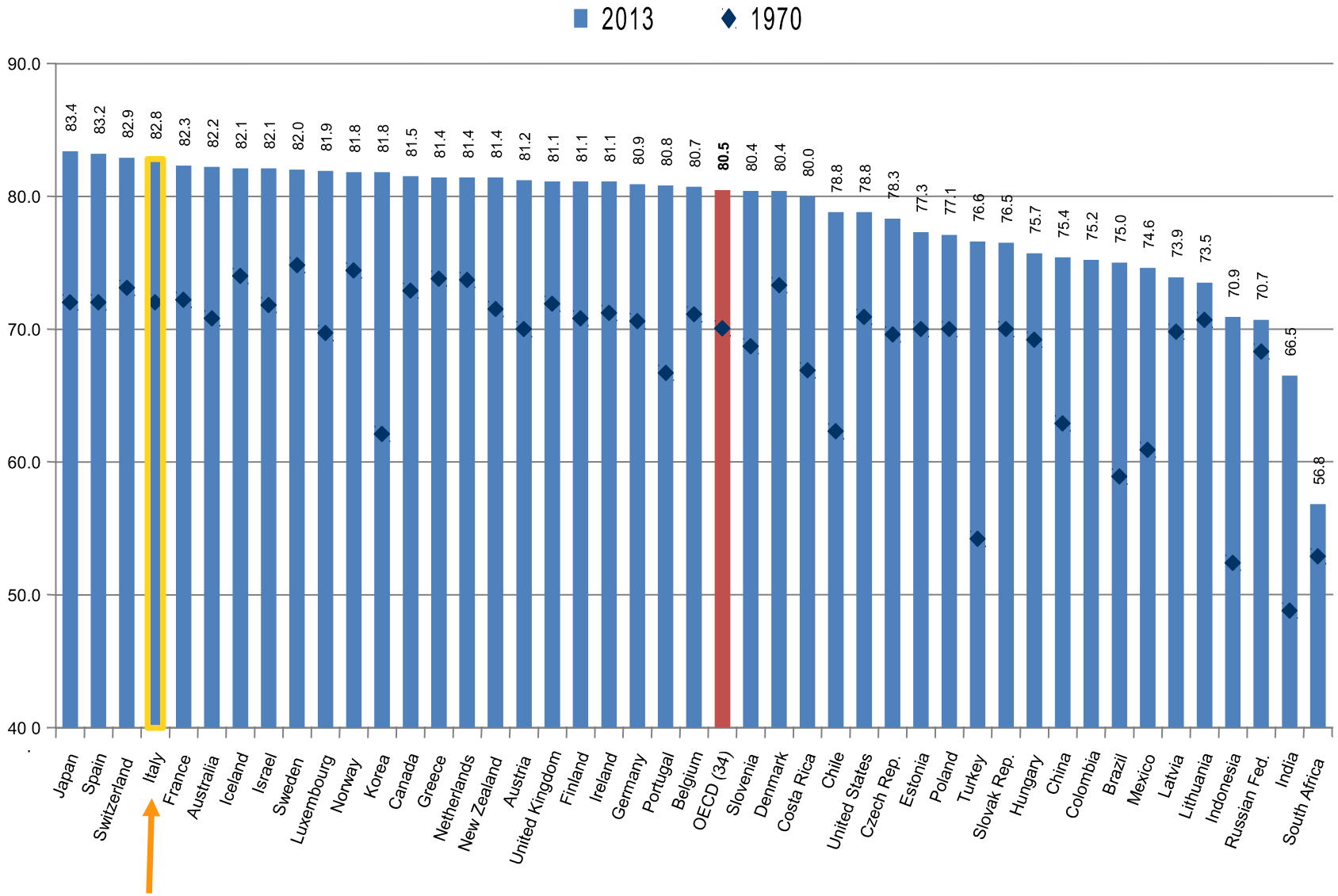
Source: OECD Health at a Glance 2015



Fabrizio Carinci
UNIVERSITY OF SURREY

Life expectancy at birth, 1970 and 2013 (or nearest years)

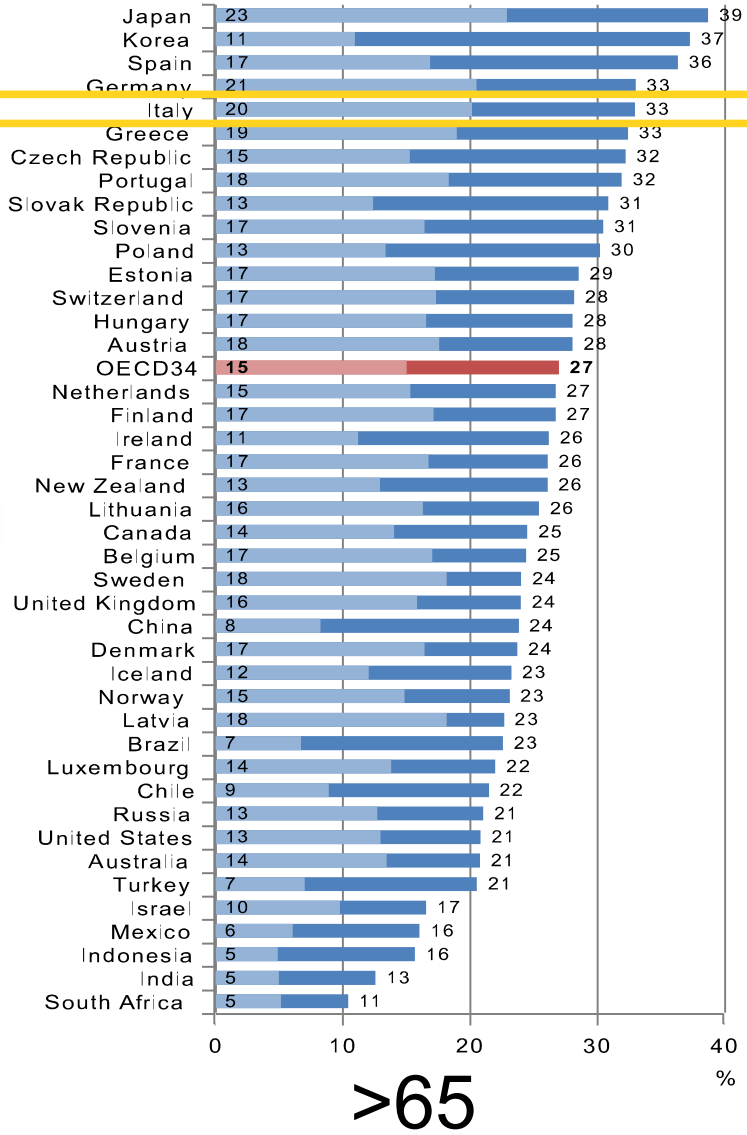
Source: OECD Health at a Glance 2015

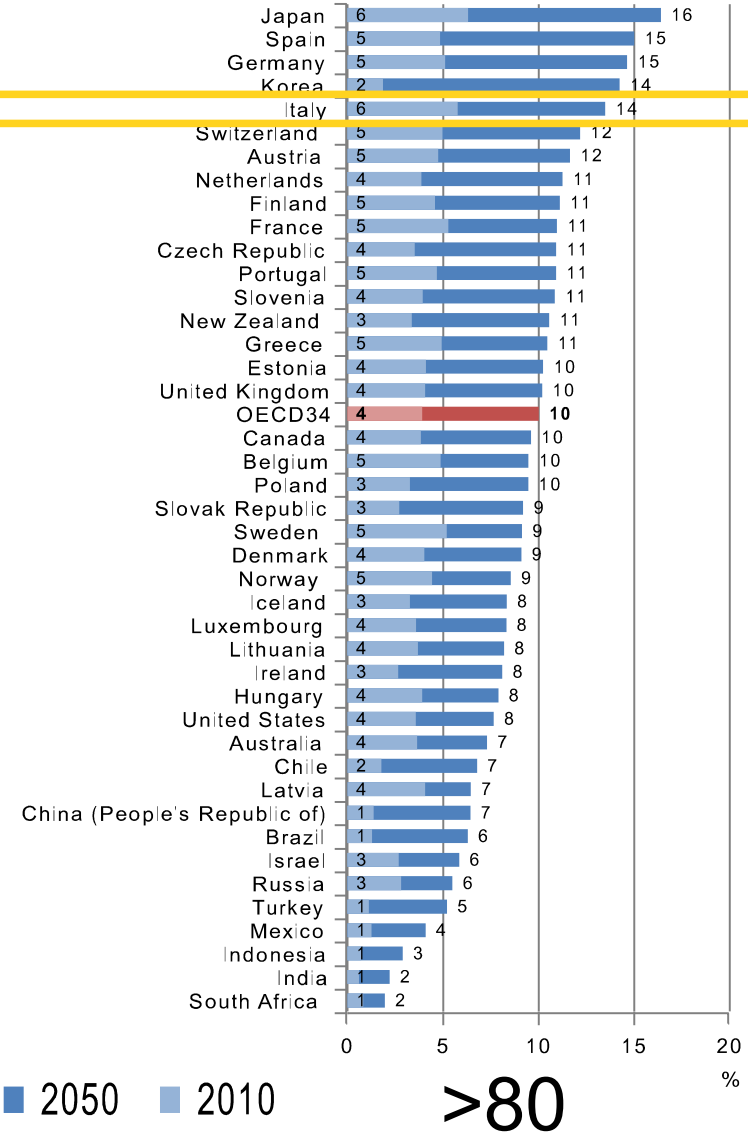


Fabrizio Carinci
UNIVERSITY OF SURREY

Share of the population aged over 65 and 80 years, 2010 and 2050

Source: OECD Health at a Glance 2015





>65

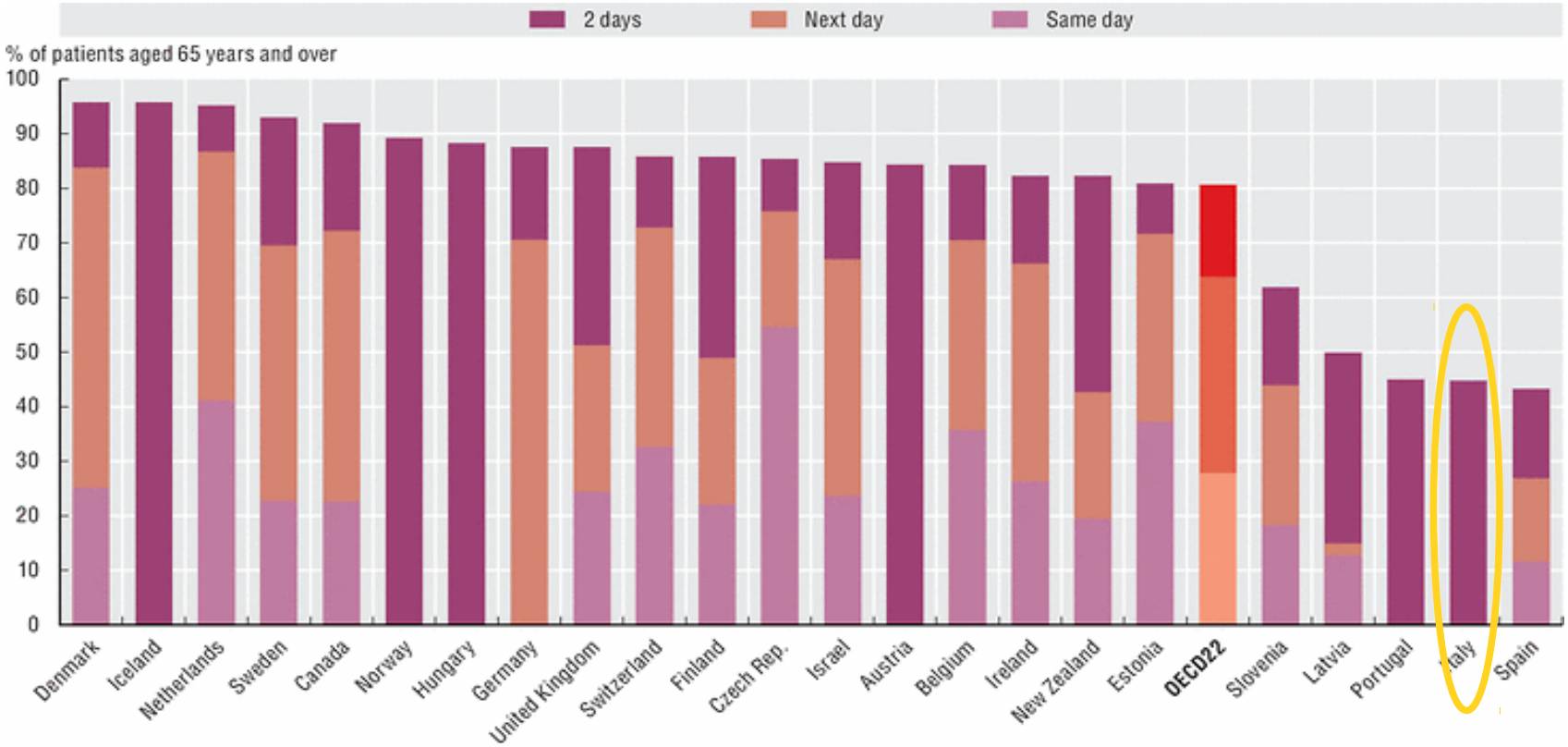
2050 2010

>80

Fabrizio Carinci
UNIVERSITY OF SURREY

Hip fracture surgery initiation after admission to hospital, 2013

Source: OECD Health at a Glance 2015



Fabrizio Carinci
UNIVERSITY OF SURREY

OECD Framework for Health System Performance Measurement

Health

Non-health care determinants of health

Current focus of HCQI project

Healthcare System Performance

How does the health system perform? What is the level of quality of care across the range of patient care needs? What does the performance cost?

Dimensions						
	Quality				Access	Cost / expenditure
Health care needs	Effectiveness	Safety	Responsiveness / patient centredness		Accessibility	
Primary prevention			Individual patient experiences	Integrated care		
Getting better						
Living with illness or disability / chronic care						
Coping with end of life						

Equity

Efficiency

Macro and micro-economic efficiency

Health system design, policy and context

http://www.oecd.org/els/health-systems/health-carequality-indicators.htm

UNIVERSITY OF SURREY

International Journal for Quality in Health Care Advance Access published March 10, 2015

ISQua

International Journal for Quality in Health Care, 2015, 1–10
doi: 10.1093/intqhc/mzv004
Article

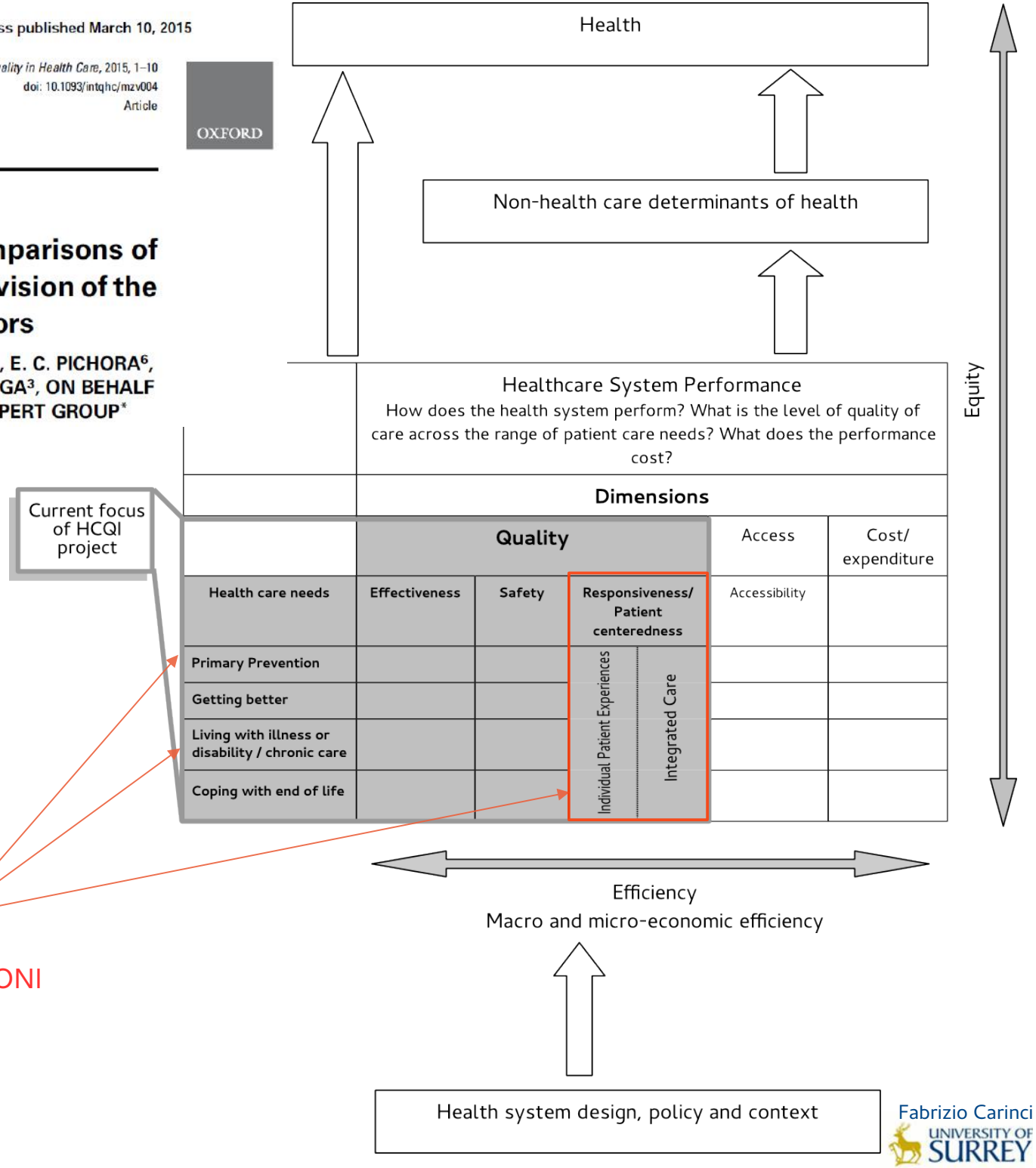
OXFORD

Article

Towards actionable international comparisons of health system performance: expert revision of the OECD framework and quality indicators

F. CARINCI[1,2], K. VAN GOOL[3,4], J. MAINZ[5], J. VEILLARD[6], E. C. PICHORA[6], J. M. JANUEL[7], I. ARISPE[8], S. M. KIM[9], and N.S. KLAZINGA[3], ON BEHALF OF THE OECD HEALTH CARE QUALITY INDICATORS EXPERT GROUP*

Sistema di Valutazione delle Performance OCSE 2015: Indicatori "azionabili"



NUOVE DEFINIZIONI

Fabrizio Carinci
UNIVERSITY OF SURREY

Effectiveness – Getting better

GETTING BETTER	AC	**Admission-based AMI 30 day in-hospital (same hospital) mortality** **Patient-based AMI 30 day (in-hospital and out of hospital) mortality** **Patient-based ischemic stroke 30 day (in-hospital and out of hospital) mortality** **Admission-based ischemic stroke 30 day in-hospital (same hospital) mortality** **Admission-based hemorrhagic stroke 30 day in-hospital (same hospital) mortality** **Patient-based hemorrhagic stroke 30 day (in-hospital and out of hospital) mortality** **Hip-fracture surgery initiated within 48 hours after admission to the hospital** Patient-based AMI 30 day in-hospital (any hospital) mortality Patient-based ischemic stroke 30 day in-hospital (any hospital) mortality Patient-based hemorrhagic stroke 30 day in-hospital (any hospital) mortality
	CC	**Breast cancer five year relative survival** **Cervical cancer five year relative survival** **Colorectal cancer five year relative survival** ***Breast cancer mortality in women*** ***Cervical cancer mortality*** ***Colorectal cancer mortality***
	PC	**Overall volume of antibiotics for systemic use prescribed** **Volume of cephalosporins/quinolones as proportion of all systemic antibiotics prescribed**

Carinci F, Van Gool K, Mainz J, Veillard JH, Januel JM, Kim SM, Arispe I, and Klazinga N, Int J Qual Health Care, February 2015

Safety – Getting better

PS	**Retained surgical item or unretrieved device fragment (15+ yrs)**
	Postoperative PE or DVT (all surgical discharges)
	Postoperative PE or DVT (hip and knee discharges)
	Postoperative sepsis (all surgical discharges)
	Postoperative sepsis (all abdominal discharges)
	Postoperative wound dehiscence (15+ yrs)
	Retained surgical item or unretrieved device fragment (0-14 yrs)
	Accidental puncture or laceration (0-14 yrs)
	Accidental puncture or laceration (15+ yrs)
	Postoperative haemorrhage or haematoma (0-14 yrs)
	Postoperative wound dehiscence (0-14 yrs)
	Postoperative haemorrhage or haematoma (15+ yrs)
PC	**Long-term use of benzodiazepines/benzodiazepine-related drugs in elderly patients**
	Use of long-acting benzodiazepines in elderly patients
	Pilot of prescription safety indicators (6 indicators)

Carinci F, Van Gool K, Mainz J, Veillard JH, Januel JM, Kim SM, Arispe I, and Klazinga N, Int J Qual Health Care, February 2015

Performance Dashboards

Source: OECD Health at a Glance 2015

Health Status	Life Expectancy at Birth – Men	Life Expectancy at Birth – Women	Life Expectancy at 65 – Men	Life Expectancy at 65 – Women	Mortality from Cardiovascular Diseases		
	3	4	8	4	**17**		
Risk Factors	Smoking in Adults	Alcohol Consumption	Obesity in Adults	Overweight and Obesity in Children			
	24	4	4	**31**			
Access to Care	Health Care Coverage	Share of Out of Pocket Medical Expenditure in Household Consumption	Unmet Medical Care Needs	Unmet Dental Care Needs			
	1	22	20	21			
Quality of Care	Asthma and COPD Hospital Admission	Diabetes Hospital Admission	Case-fatality for AMI (admission-based)	Case-fatality for ischemic stroke (admission based)	Cervical Cancer Survival	Breast Cancer Survival	Colorectal Cancer Survival
	2	1	5	7	3	15	12
Health Care Resources	Health expenditure per capita	Doctors per capita (active)	Nurses per capita (active)	Hospital beds per capita	MRI units per capita	CT scanners per capita	
	20	8	24	19	3	9	

Top Third
Middle Third
Bottom Third

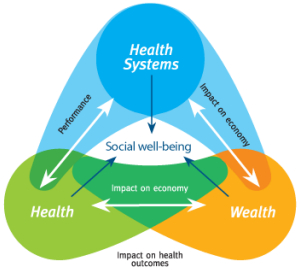
Fabrizio Carinci
UNIVERSITY OF SURREY

Italian Health Care Quality Review

Source: OECD 2015

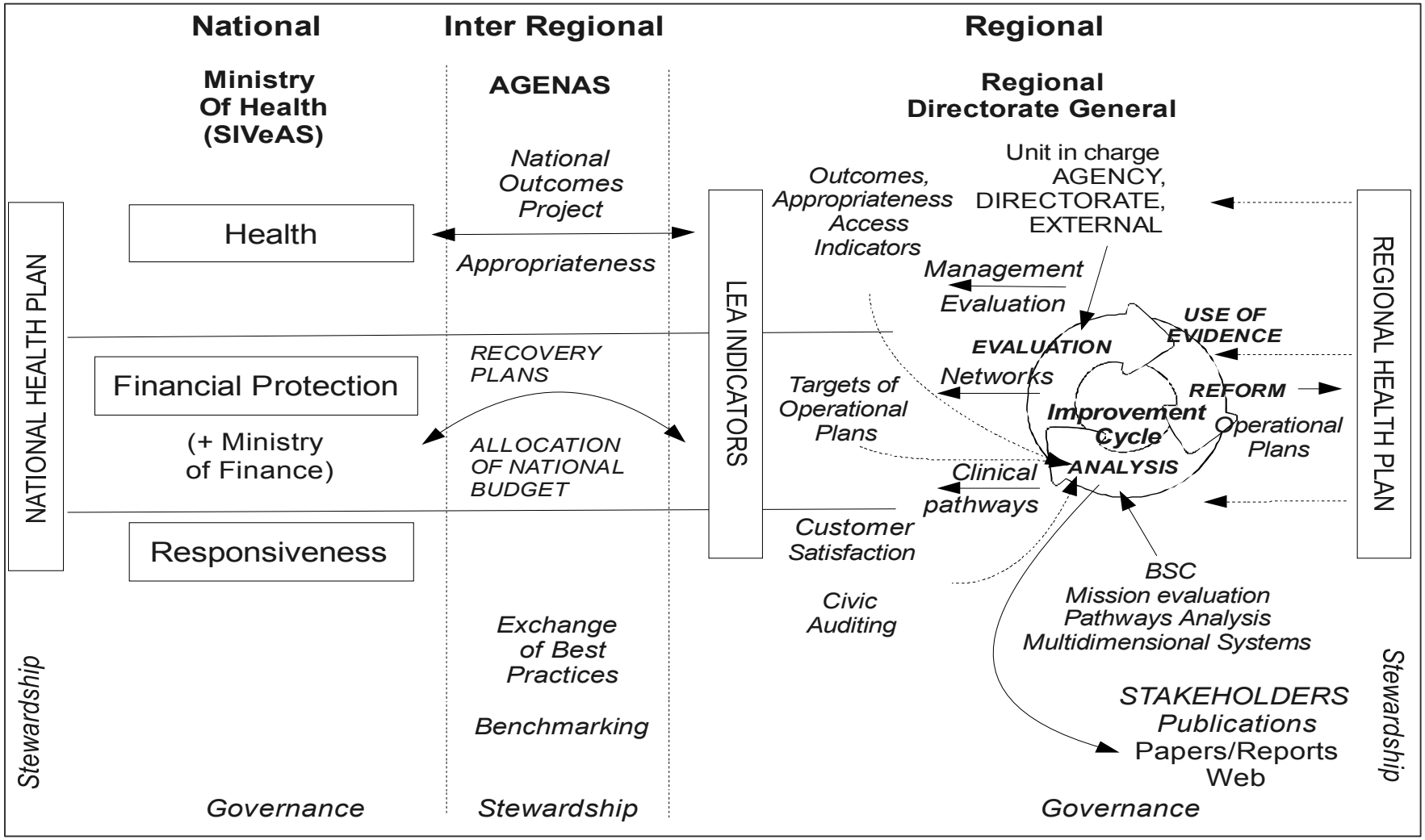
- **Ridurre la variabilità regionale e concentrarsi su qualità, non solo sulla riduzione dei costi**
- **Estendere l'infrastruttura informativa e la valutazione della performance**
- Assicurare una applicazione più consistente e rapporti regolari sulle iniziative per la qualità e gli standard minimi, incluse le cure primarie
- Espandere le cure di comunità e le linee guida per pazienti anziani con patologie multiple, e le cure integrate
- Migliorare il ruolo dei fornitori di cure primarie nella prevenzione primaria e secondaria
- **Sviluppare forme più ambiziose di controllo della qualità e sviluppo della forza lavoro in sanità, ad esempio attraverso il rinnovo delle licenze, la revisione tra pari, ed indicatori di qualità ed esito a livello di singolo professionista**

Programmazione e gestione della performance in un sistema decentrato



Carinci F, Caracci G, Di Stanislao F, Moirano F. Performance measurement in response to the Tallinn Charter: experiences from the decentralized Italian framework, Health Policy. 2012 Nov;108(1):60-6

WHO Europe
Tallinn Charter



Fabrizio Carinci
UNIVERSITY OF SURREY

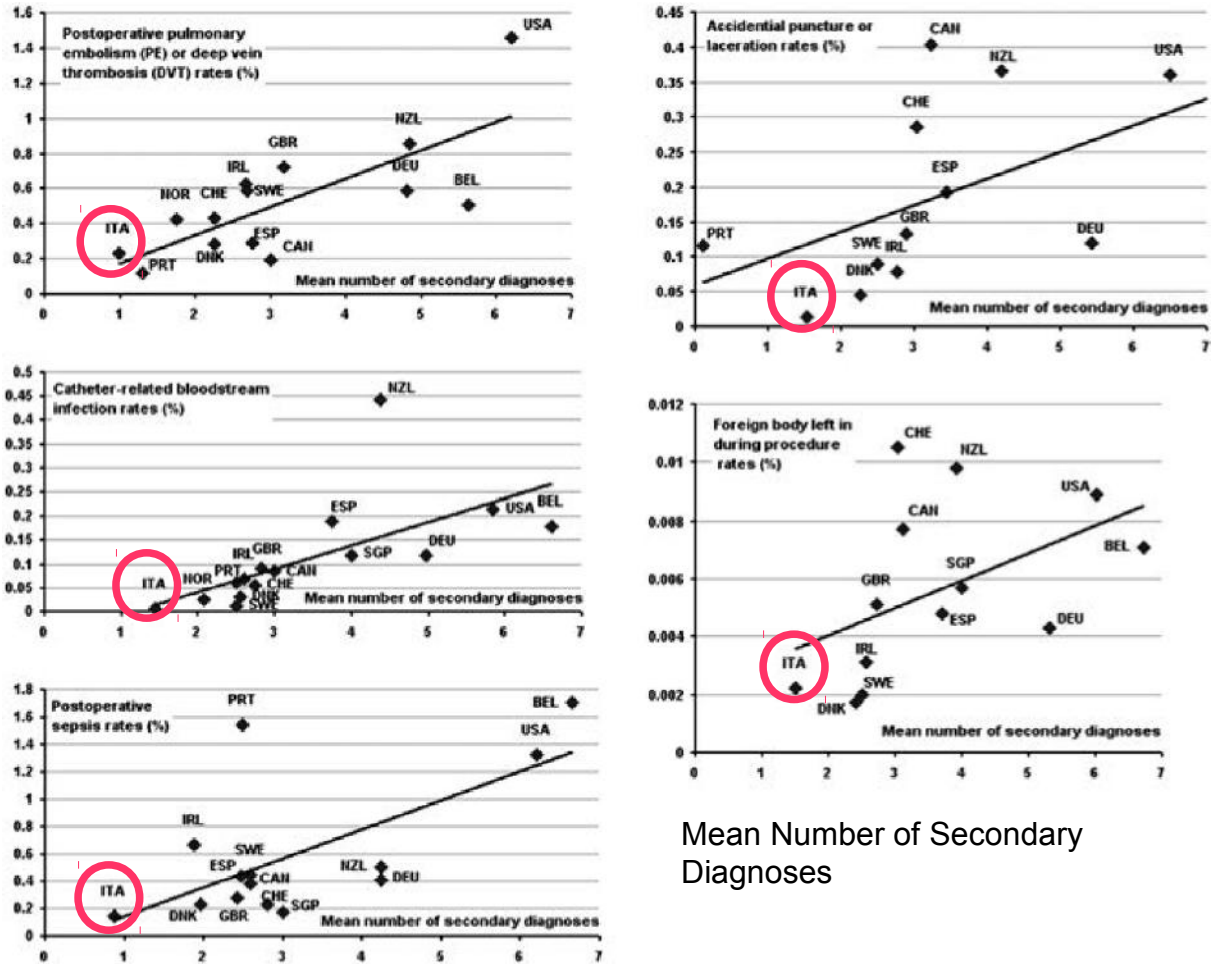
Argomenti

1. **Perchè valutare la Performance dei sistemi sanitari?**
2. Perchè c'è bisogno delle Scienze Statistiche?
3. Che si sfide si aprono con i “Big Data”?
4. Quale futuro per le Statistiche della Salute?

International comparability of Patient Safety Indicators in 15 OECD Member Countries (1)

Drösler SE, Romano PS, Tancredi DJ, Klazinga NS, International Comparability of Patient Safety Indicators in 15 OECD Member Countries: A Methodological Approach of Adjustment by Secondary Diagnoses, Health Serv Res. Feb 2012; 47(1 Pt 1): 275–292.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3447235

Age-sex standardized rates for 5 Patient Safety Indicators in 15 OECD Countries, Year 2007



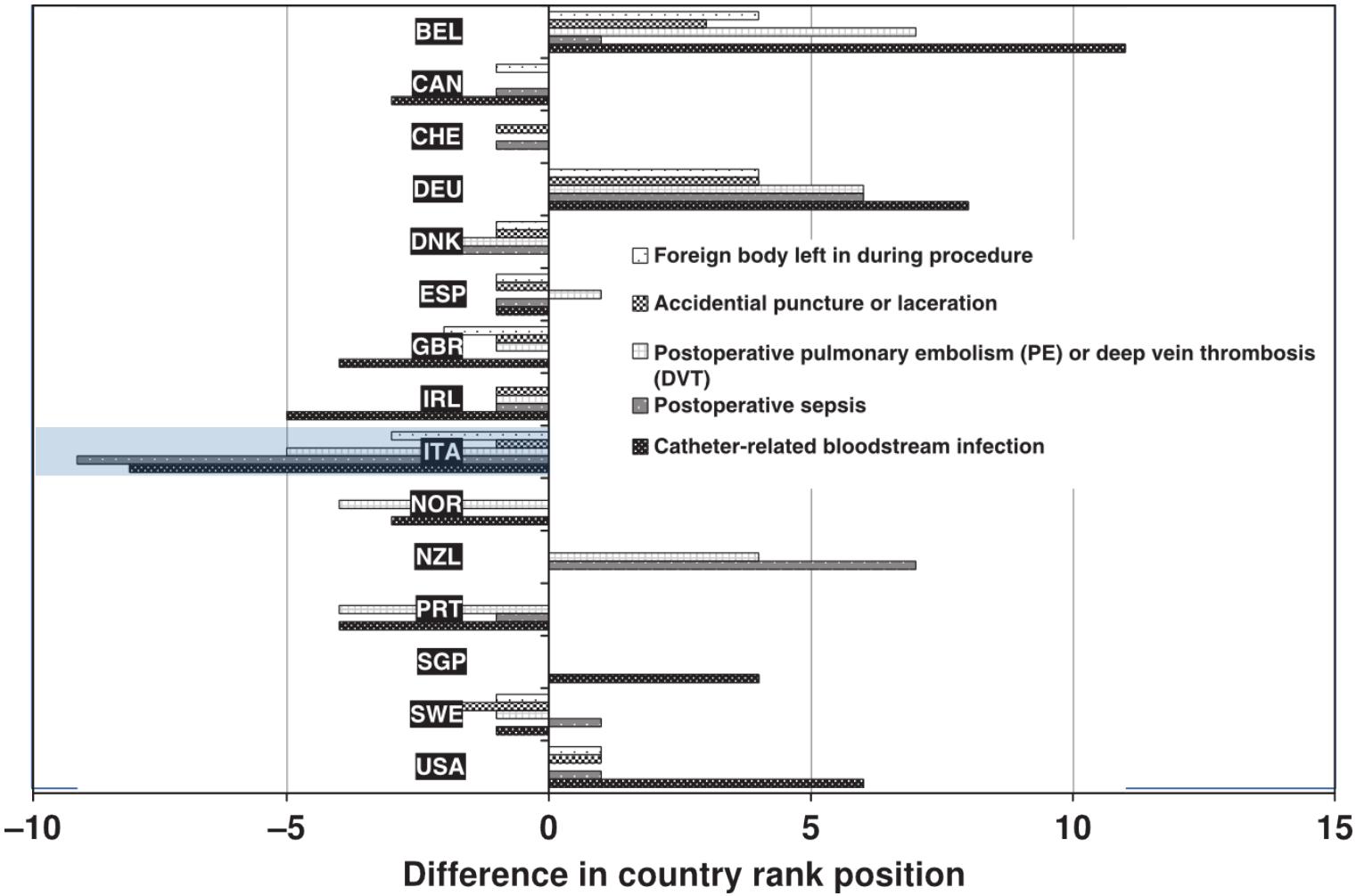
Mean Number of Secondary Diagnoses

Fabrizio Carinci
UNIVERSITY OF SURREY

International comparability of Patient Safety Indicators in 15 OECD Member Countries (2)

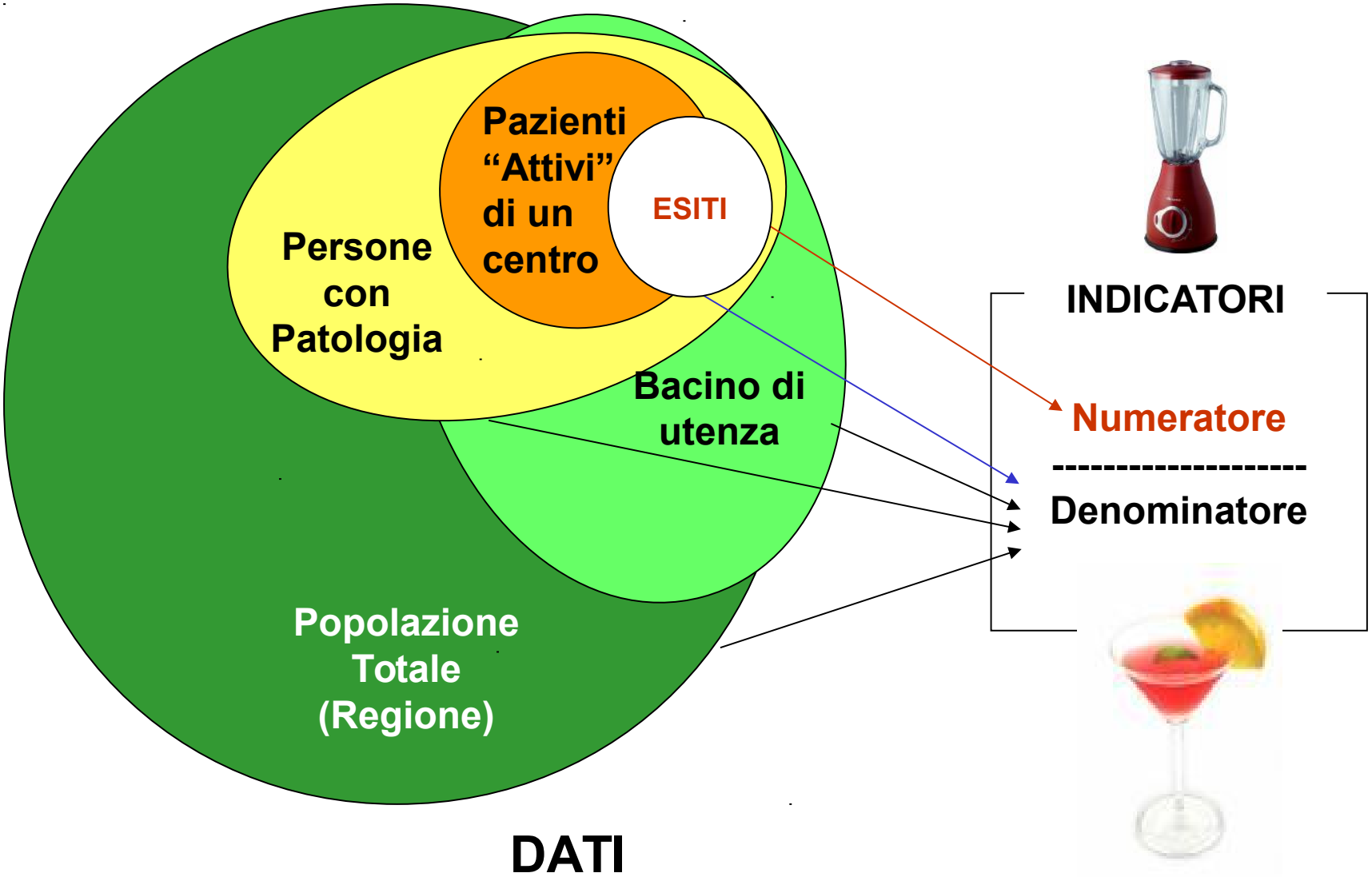
CHANGE IN COUNTRY RANKING AFTER ADJUSTMENT BY NUMBER OF SECONDARY DIAGNOSES

Drösler et al, Health Serv Res. Feb 2012; 47(1 Pt 1): 275–292



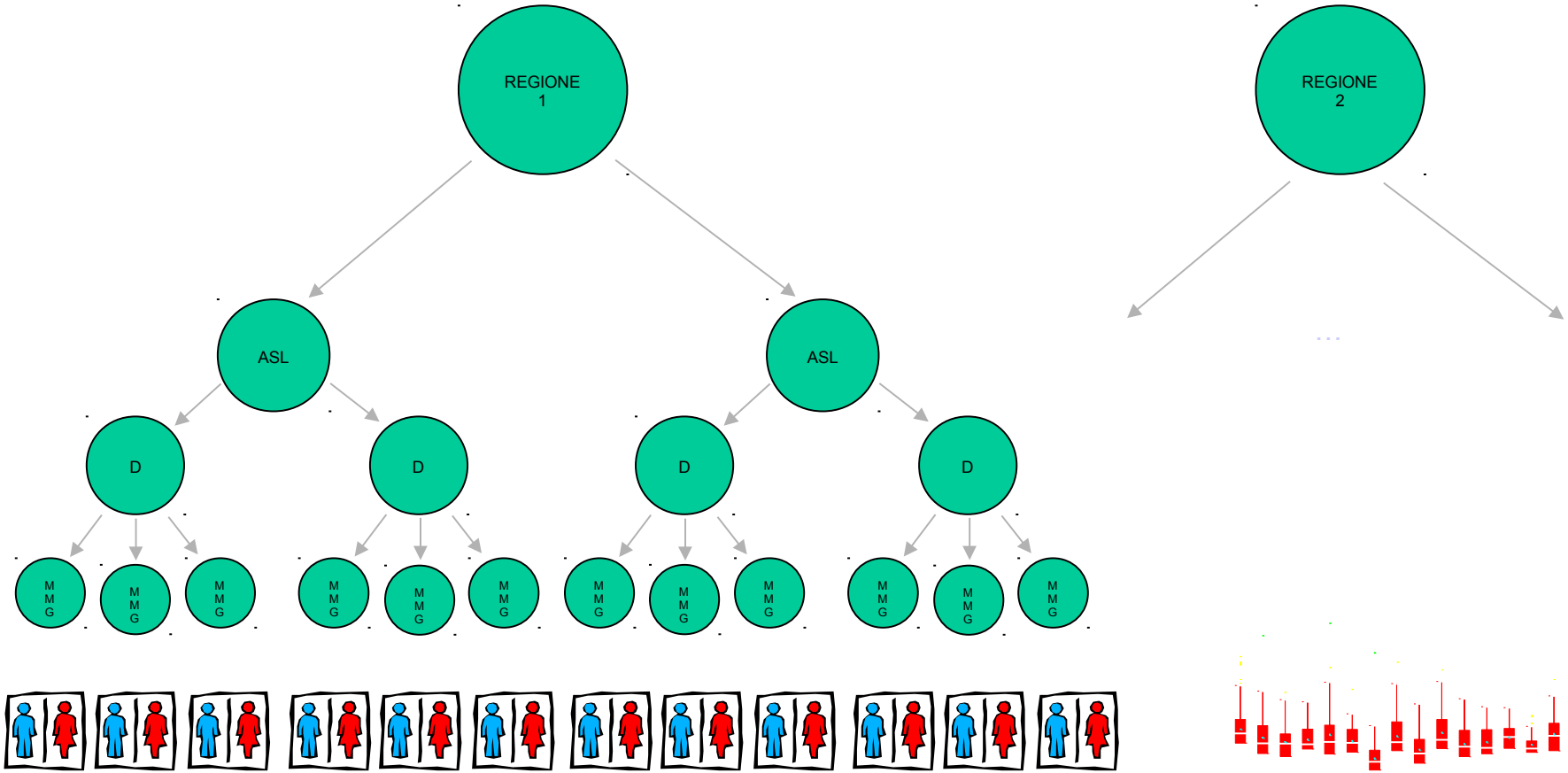
Fabrizio Carinci
UNIVERSITY OF SURREY

Il „selection bias" nei dati di routine basati sulla popolazione (es. patologia cronica)



Fabrizio Carinci
UNIVERSITY OF SURREY

Effetti „a cluster“

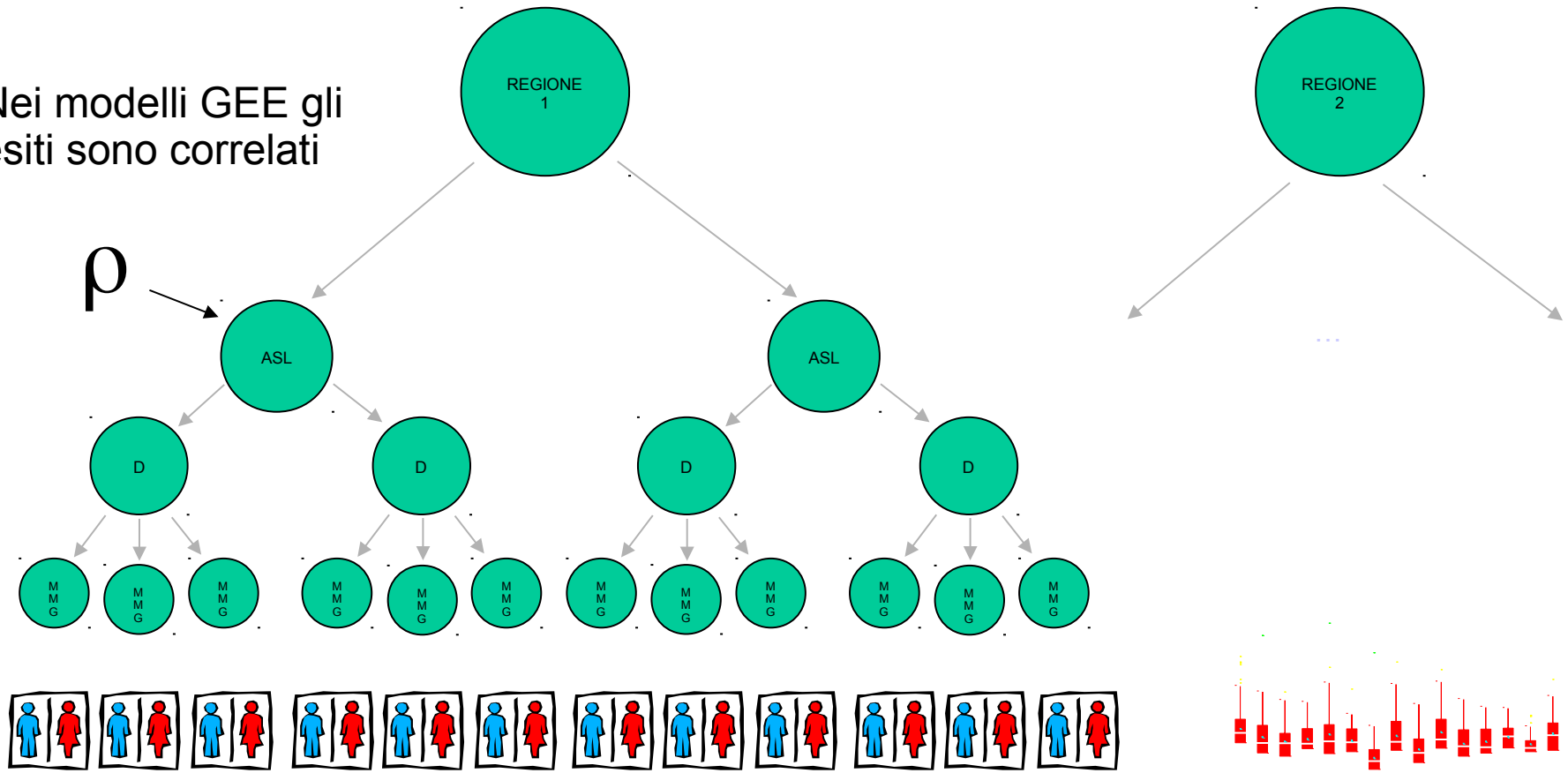


MODELLING

Fabrizio Carinci
UNIVERSITY OF SURREY

Effetti „a cluster"

Nei modelli GEE gli esiti sono correlati



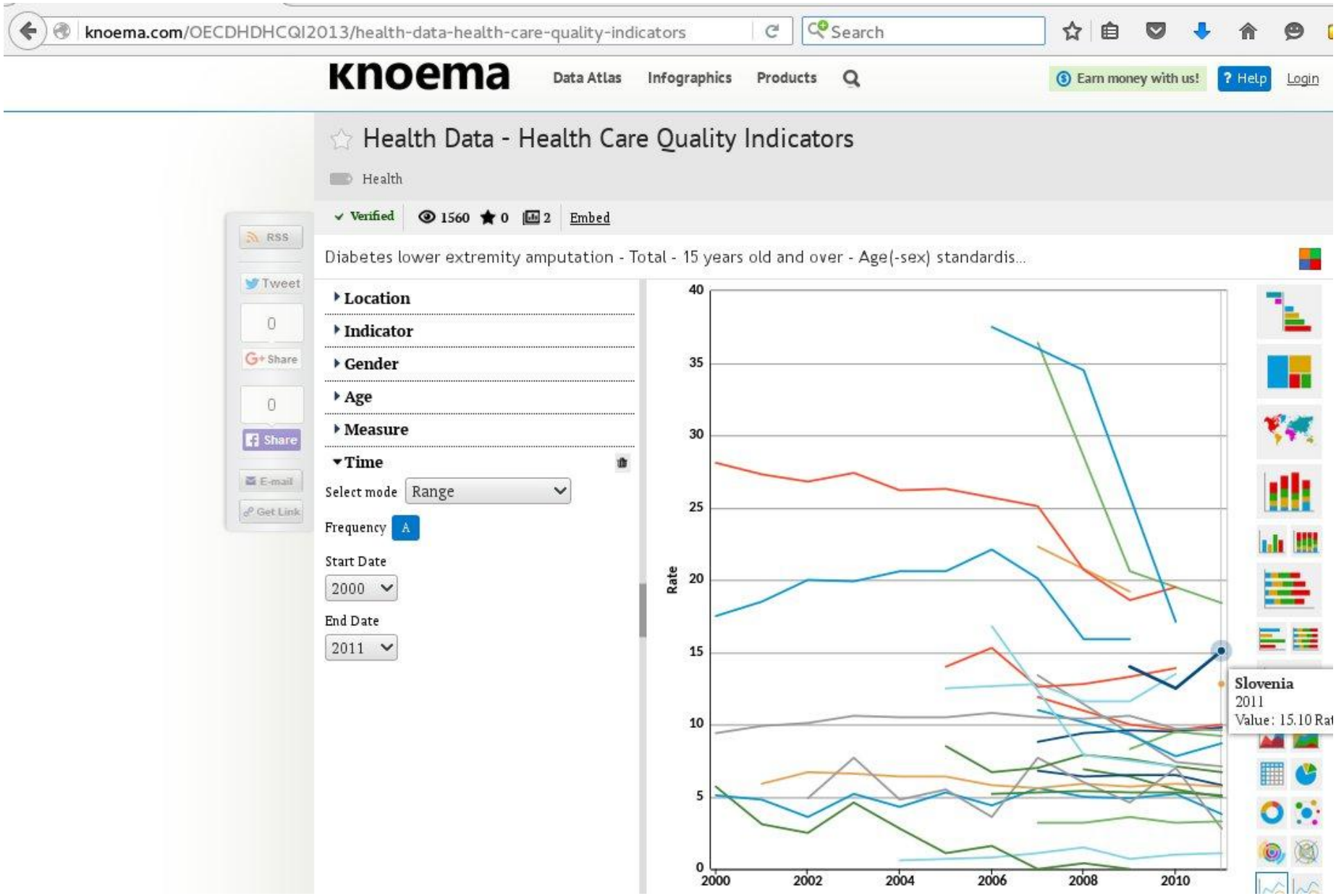
MODELLING

Fabrizio Carinci
UNIVERSITY OF SURREY

Amputazioni nel diabete: stiamo migliorando?

- L'amputazione degli arti inferiori è un esito clinico riconosciuto nella naturale evoluzione del diabete, che è stato ampiamente usato per monitorare la qualità della cura nella pratica clinica
- A 25 anni dalla St.Vincent Declaration, c'è ancora una informazione limitata a livello internazionale per confrontare le amputazioni agli arti inferiori nel diabete.
- L'OCSE ha incluso le amputazioni nella raccolta dati internazionale del progetto Health Care Quality Indicators a partire dal 2006. Non c'è stato però mai sufficiente accordo per inserirne i risultati nella pubblicazione "Health at a Glance", volume nel quale vengono pubblicati i risultati principali del progetto.
- Dati apparentemente semplici, analisi complessa e potenzialmente contraddittoria

Amputation Rates in Diabetes (OECD 2013)



Fabrizio Carinci
UNIVERSITY OF SURREY

Tasso di amputazioni degli arti inferiori nel Diabete OCSE 2000-2011

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5014879/

Acta Diabetol
DOI 10.1007/s00592-016-0879-4

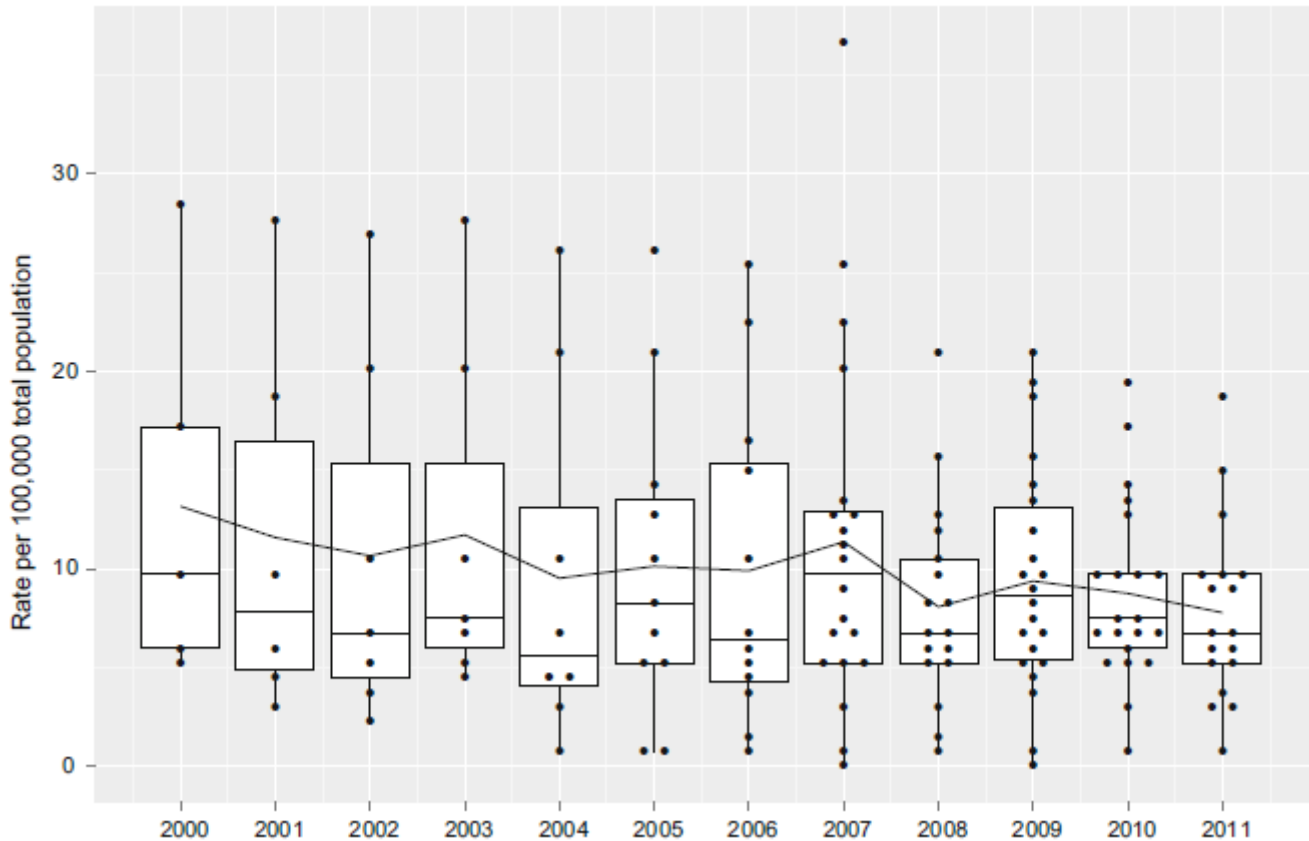
CrossMark

ORIGINAL ARTICLE

Lower extremity amputation rates in people with diabetes as an indicator of health systems performance. A critical appraisal of the data collection 2000–2011 by the Organization for Economic Cooperation and Development (OECD)

F. Carinci[1] · M. Massi Benedetti[2] · N. S. Klazinga[3,4] · L. Uccioli[5]

Received: 15 January 2016 / Accepted: 20 June 2016



Tasso di amputazioni degli arti inferiori nel Diabete OECD 2000-2011

L.Uccioli, M.Massi Benedetti, N.Klazinga and F.Carinci, Lower extremity amputation rates in diabetes as an indicator of health systems performance: a critical appraisal of the OECD data collection 2000-2011, Submitted 2015

SAS source code

```
proc genmod data=retro;
class Country;
model value=primary_tax Year;
repeated subject = Country / type=exch corrw; run; quit;
```

Initial GEE model output

Analysis Of Initial Parameter Estimates

Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr>ChiSq
Intercept	1	14.6734	1.4494	11.8325	17.5142	102.48	<.0001
primary_tax	1	-5.3978	1.1116	-7.5766	-3.2191	23.58	<.0001
Year	1	-0.3110	0.1810	-0.6657	0.0436	2.95	0.0856
Scale	1	6.9018	0.3907	6.1770	7.7118		

Tasso di amputazioni degli arti inferiori nel Diabete OCSE 2000-2011

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5014879/

Acta Diabetol
DOI 10.1007/s00592-016-0879-4

CrossMark

ORIGINAL ARTICLE

Lower extremity amputation rates in people with diabetes as an indicator of health systems performance. A critical appraisal of the data collection 2000–2011 by the Organization for Economic Cooperation and Development (OECD)

F. Carinci[1] · M. Massi Benedetti[2] · N. S. Klazinga[3,4] · L. Uccioli[5]

Received: 15 January 2016 / Accepted: 20 June 2016

Table 3 Results of multivariate linear regression (generalized estimating equations), OECD 2000–2011 *Source* OECD health system characteristics survey, 2012; health care quality indicators project (revised version, data collection 2013)

Model/Variable	Estimate	S.E.	95 %C.I.	$P > Z$
Model 1 [Complete dataset; N countries = 26]				
Tax-based system	−4.55	1.95	−8.38, −0.72	0.020
Use of registry	2.93	2.53	−2.03, 7.89	0.247
Non-ICD coding	−7.04	2.14	−11.24, −2.84	0.001
Average year change	−0.27	0.11	−0.50, −0.05	0.015
Model 2 [Financing: Tax-based; N countries = 12; Median LEARD: 7.55 (2000), 6.25 (2011)]				
Average Year Change	−0.16	0.09	−0.33, 0.01	0.064
Model 2 [Financing: Social insurance; N countries = 14; Median LEARD: 17.50 (2000), 8.15 (2011)]				
Average year change	−0.36	0.18	−0.71, −0.01	0.046

Studio OCSE Tasso di amputazioni degli arti inferiori nel Diabete

Analisi delle SDO nazionali (Carinci et al 2015)

Italia 2002-2013 (N=99.649.200)

Totale 2013: N=7.272.173; N 250xx=522.335 (7.2%)

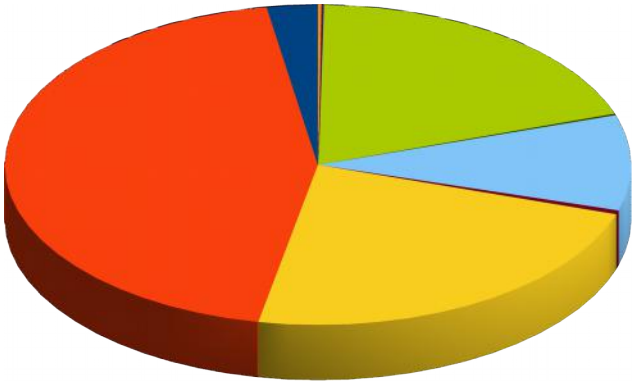
Distribuzione dei Soggetti **Amputati** per Procedura ICD

con ICD 250.xx stesso ricovero

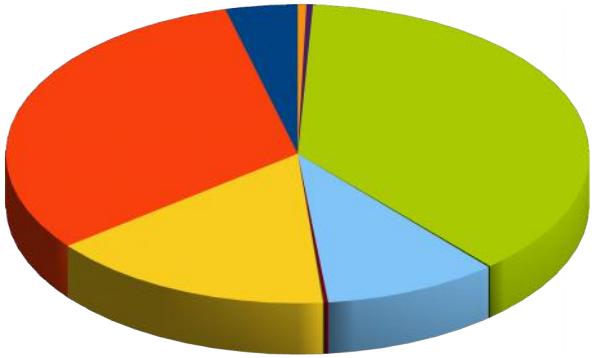
no ICD 250.xx stesso ricovero ma ICD 250.xx in precedente ricovero

con diabete

N=7.700



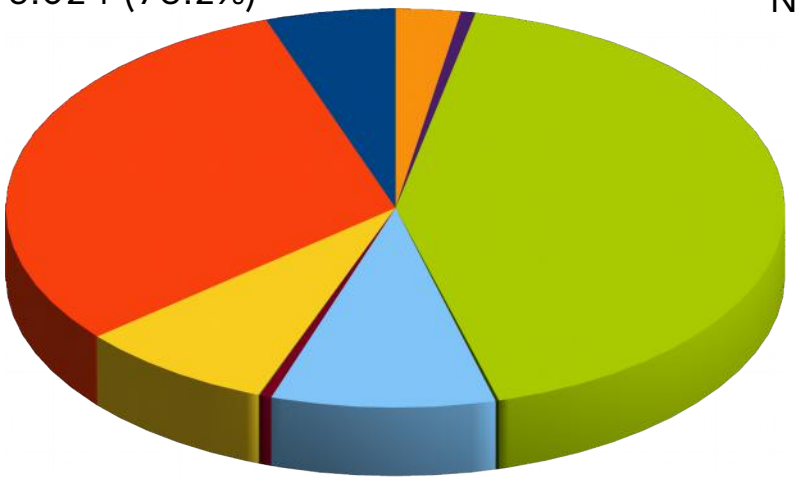
N=6.024 (78.2%)



N=1.676 (21.8%)

senza diabete

N=4.149



ICD Procedure

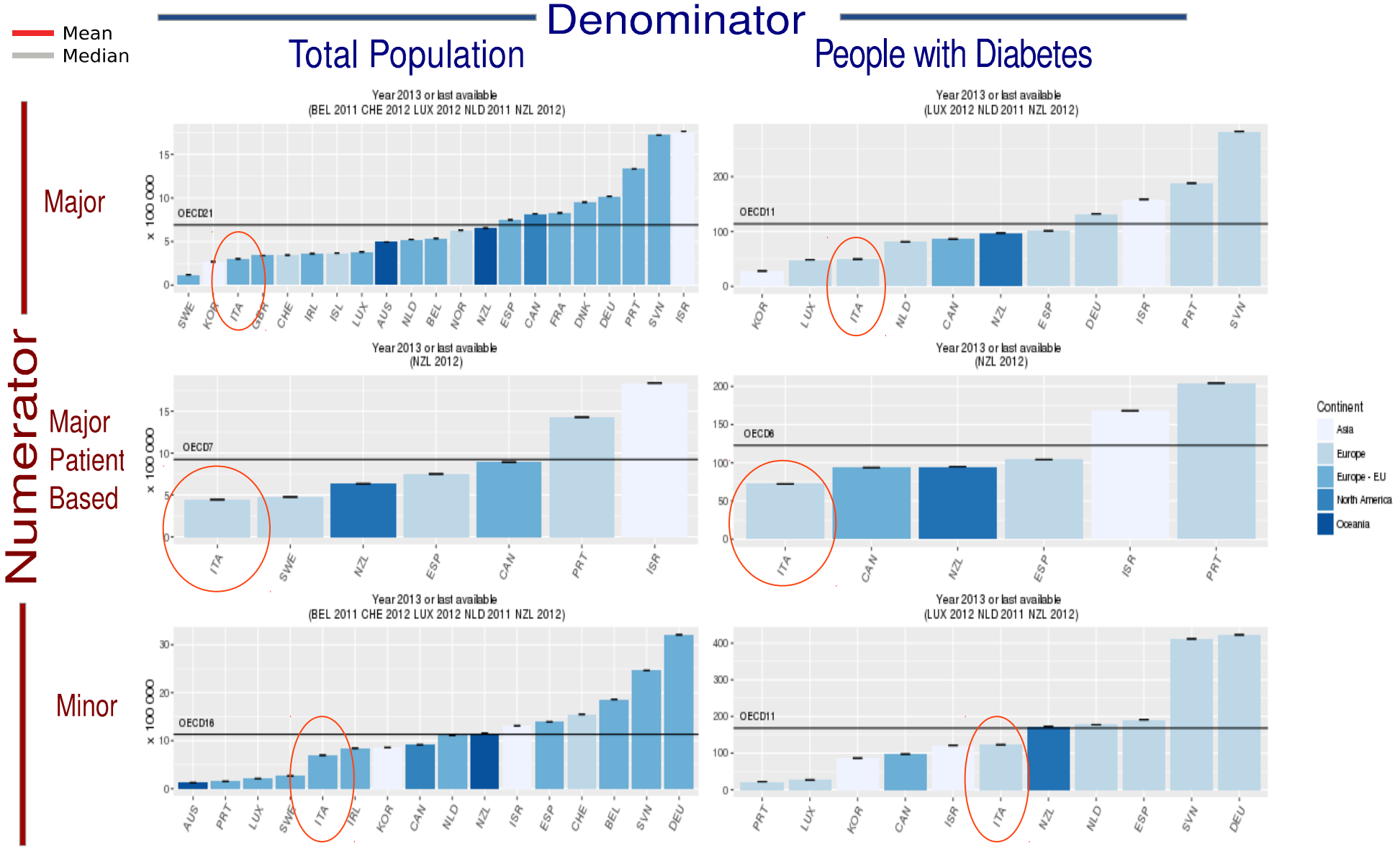
84.10 84.11 84.12 84.13 84.14 84.15 84.16 84.17 84.18 84.19

Fabrizio Carinci
UNIVERSITY OF SURREY

OECD Health Care Quality Indicators 2015

Tasso di amputazioni degli arti inferiori nel Diabete

Tassi Standardizzati per Paese (Età≥15 anni), Anno 2013 o ultimo disponibile

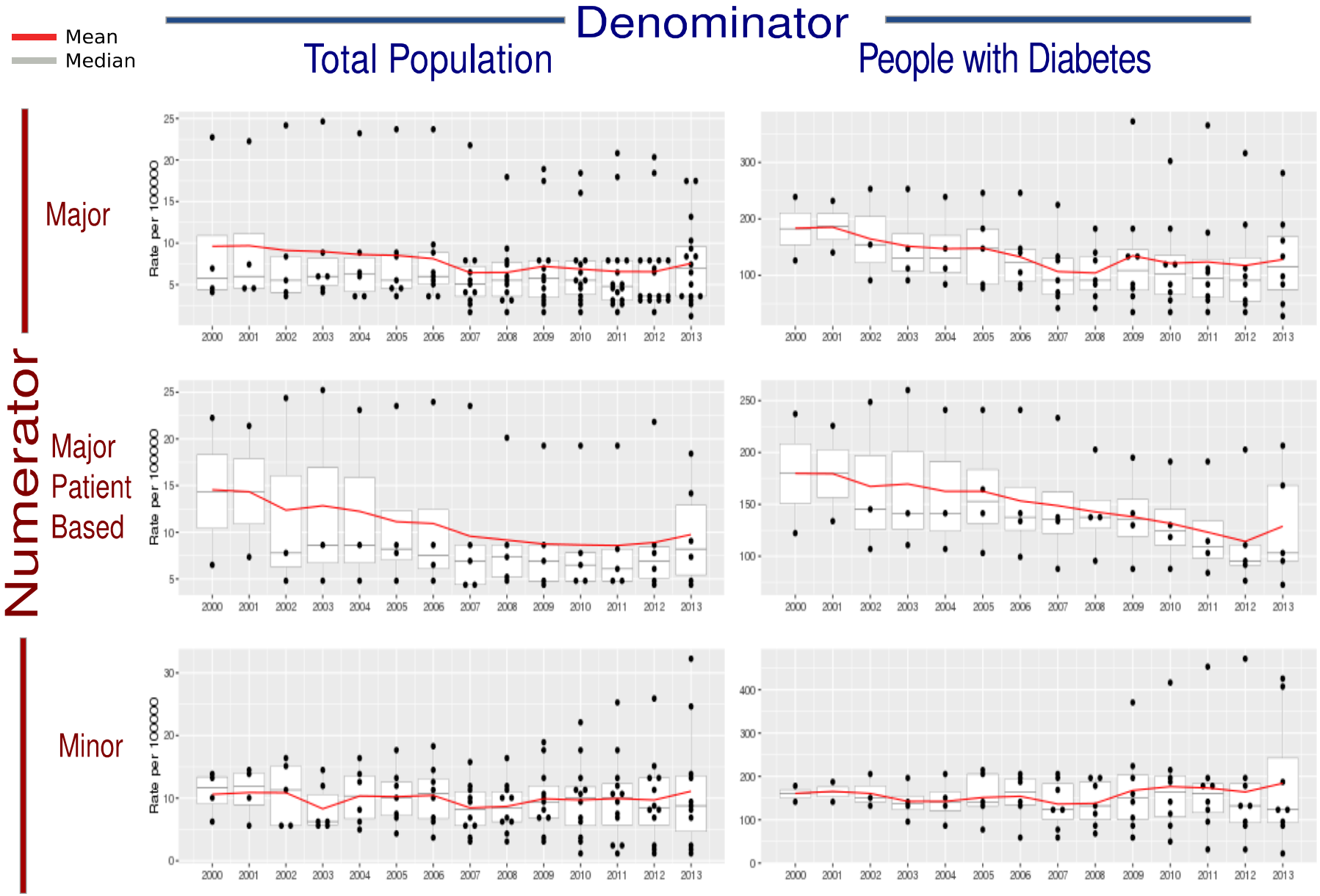


Fabrizio Carinci
UNIVERSITY OF SURREY

OECD Health Care Quality Indicators 2015

Tasso di amputazioni degli arti inferiori nel Diabete

Tassi Standardizzati per Paese (Età≥15 anni), Anni 2000-2013

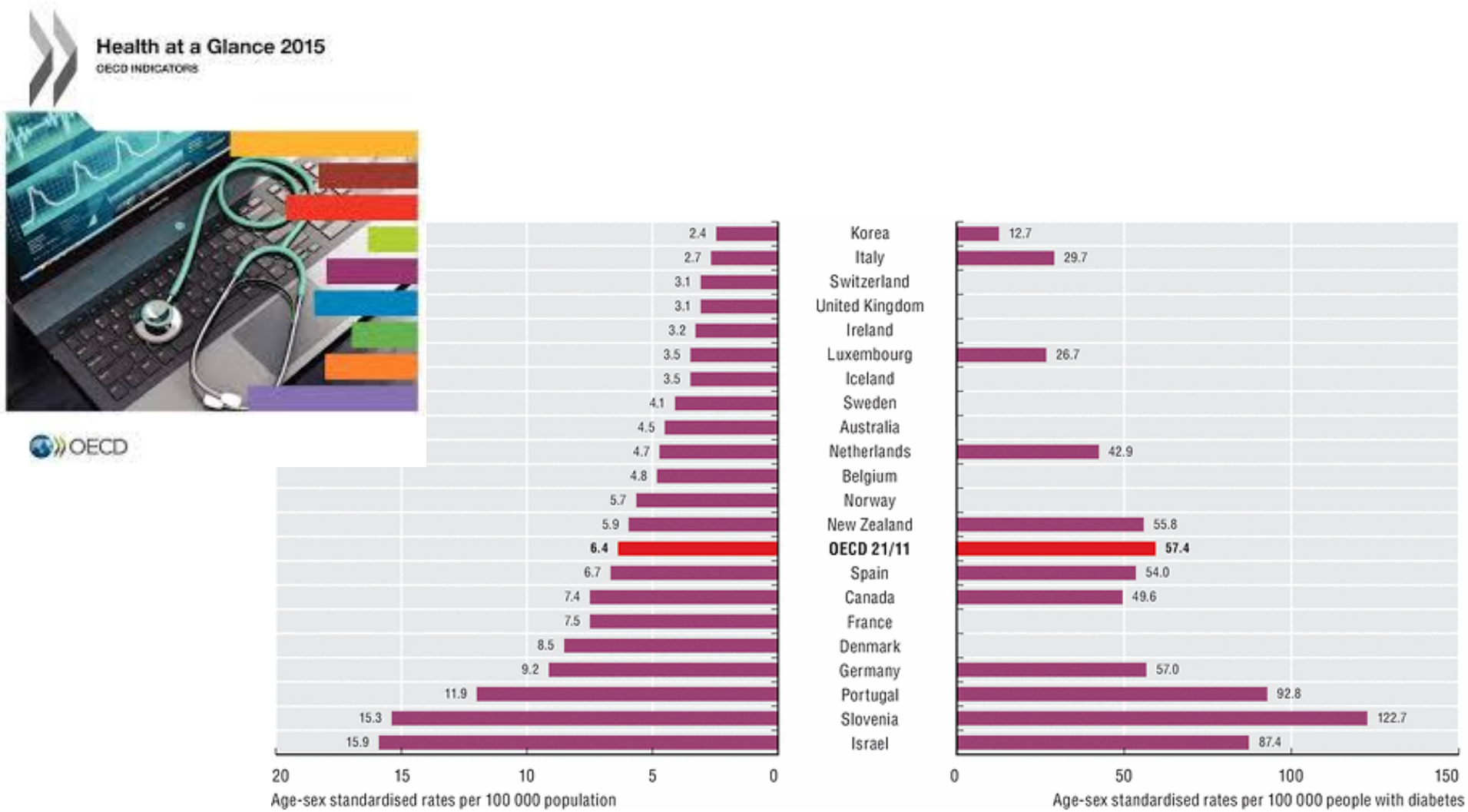


Fabrizio Carinci
UNIVERSITY OF SURREY

Major lower extremity amputation in adults with diabetes, 2013

Source: OECD Health at a Glance 2015

http://www.oecd.org/health/health-systems/health-at-a-glance-19991312.htm



Fabrizio Carinci
UNIVERSITY OF SURREY

OECD 2015 – Tassi di amputazione

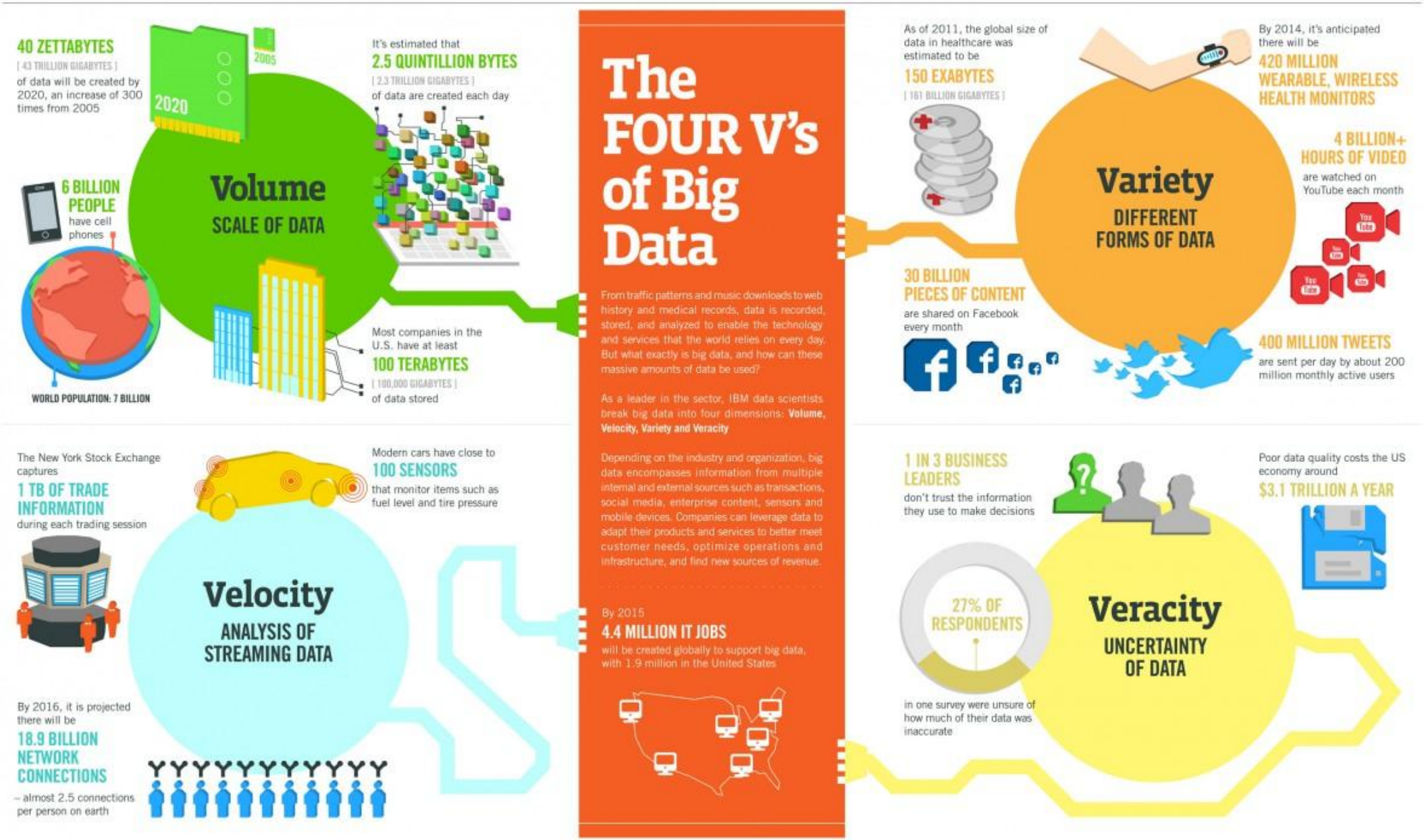
I risultati applicati all'Italia 2002-2013

- Nel 2013, usando la definizione OCSE più accurata tra quelle raccomandate dalla nuova revisione, abbiamo trovato un totale di 2.623 amputazioni maggiori in Italia.
- Il risultato è sostanzialmente inferiore (metà) rispetto alla media OCSE riscontrata nel 2013.
- Ma dice anche che ogni **3 ore e mezza, 1 persona con diabete** viene sottoposta ad **1 amputazione maggiore**.
- Mentre questa riduzione deve continuare a migliorare in futuro, c'è ancora bisogno di pianificare e monitorare tale condizione su base continuativa. Dati precisi sui costi per l'intera cura del piede diabetico non sono ancora disponibili, mentre quelli esistenti si basano su studi a campione non facilmente generalizzabili.

Argomenti

1. **Perchè valutare la Performance dei sistemi sanitari?**
2. Perchè c'è bisogno delle Scienze Statistiche?
3. Che si sfide si aprono con i “Big Data”?
4. Quale futuro per le Statistiche della Salute?

Big Data



IBM SURREY

SCI-DC
SCOTTISH CARE INFORMATION DIABETES COLLABORATION

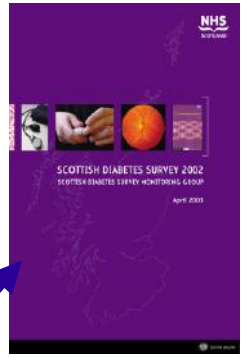
Registro Diabete Scozia

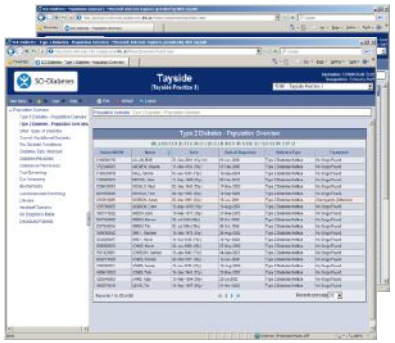
NHS SCOTLAND

Laboratory Results

It's more than just a number chi

Community Health Index





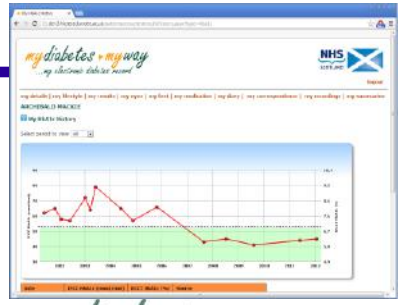
Audit and Reporting

emis

Primary Care Systems

inps
A CEGEDIM COMPANY

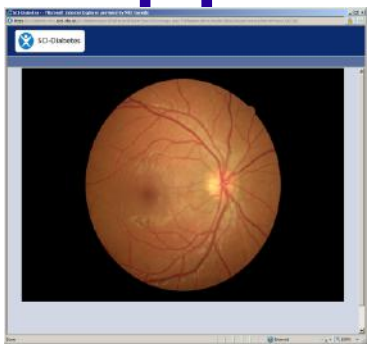
SCI-Diabetes



my diabetes my way

Secondary Care Systems

Inpatient Linkage



Diabetic Retinopathy Screening

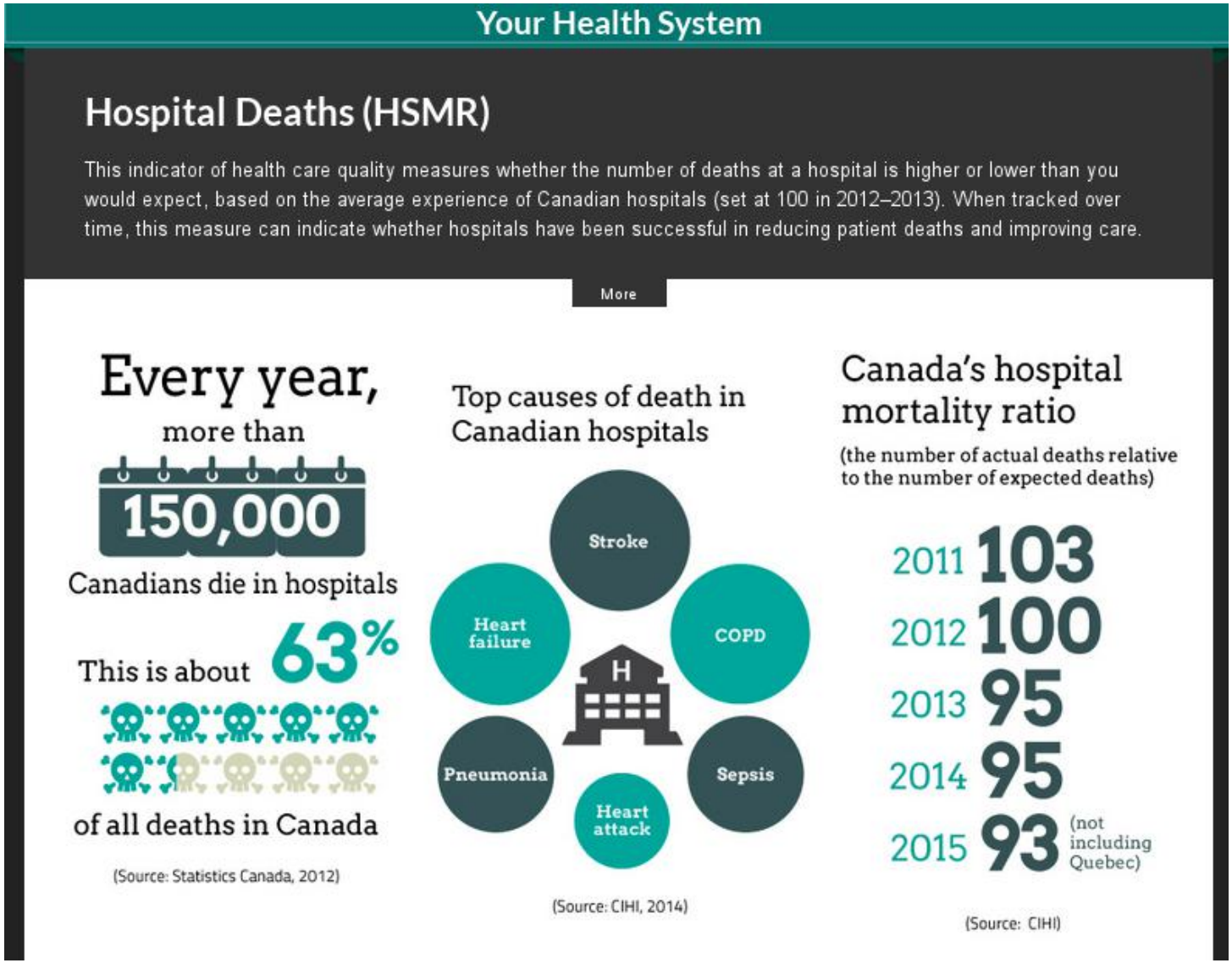
Scottish Diabetes Research Network

Fabrizio Carinci
UNIVERSITY OF SURREY

Portali della performance

Canada: Your Health System

https://yourhealthsystem.cihi.ca

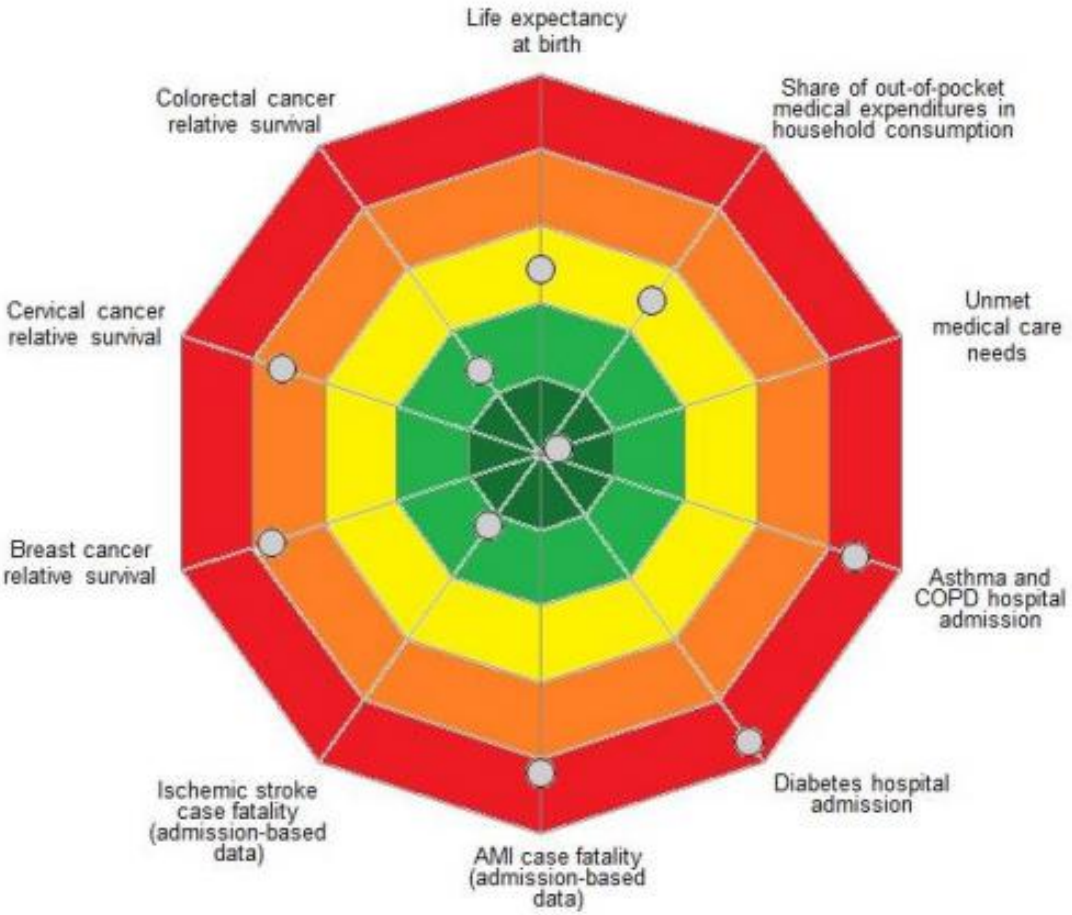


Dartboard diagram

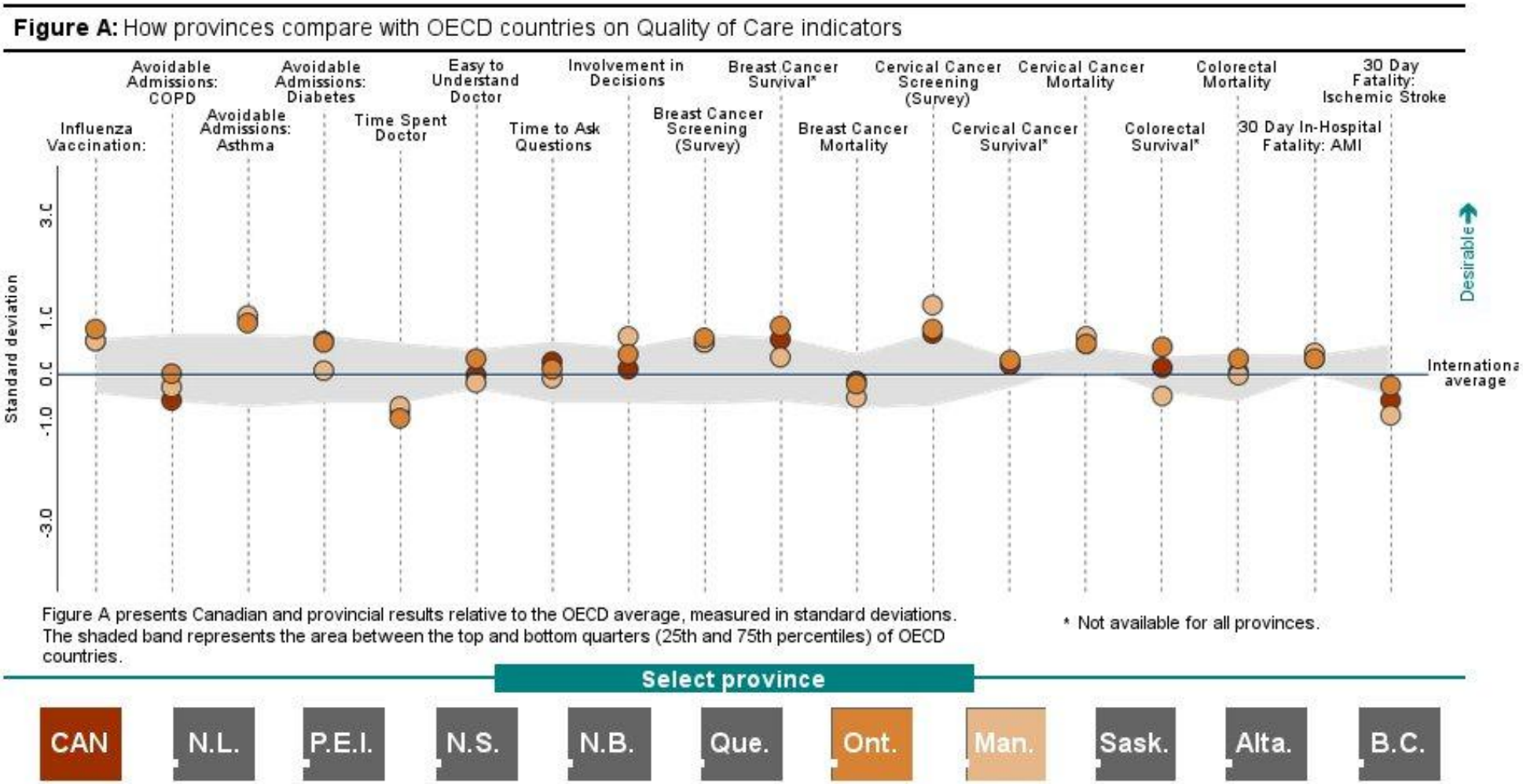
To visually represent the results of the six areas, each organization is presented with a specific "target" diagram, divided into five assessment bands.

The closer the organization is to the target level of each performance indicator, the nearer the relative circle will be to the centre.

This approach is nice, but it has known methodological limitations and interpretative drawbacks. **There is no perfect graphical representation!**

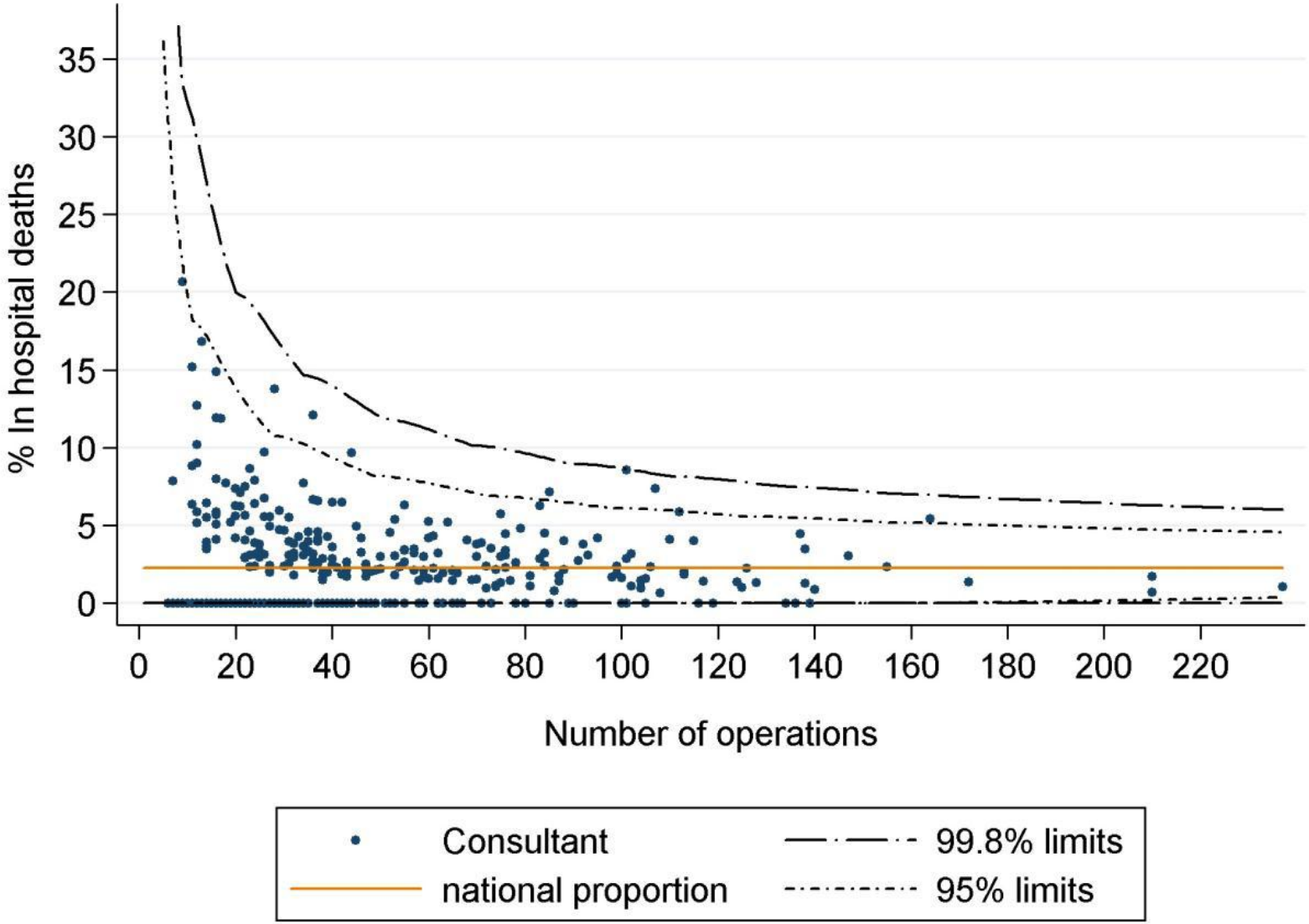


Canada: confronto tra Province vs Canada vs risultati medi OCSE



UK: Funnel Plots

Risk-adjusted in-hospital mortality after elective abdominal aortic aneurysm repair: surgeon figures in comparison to national average

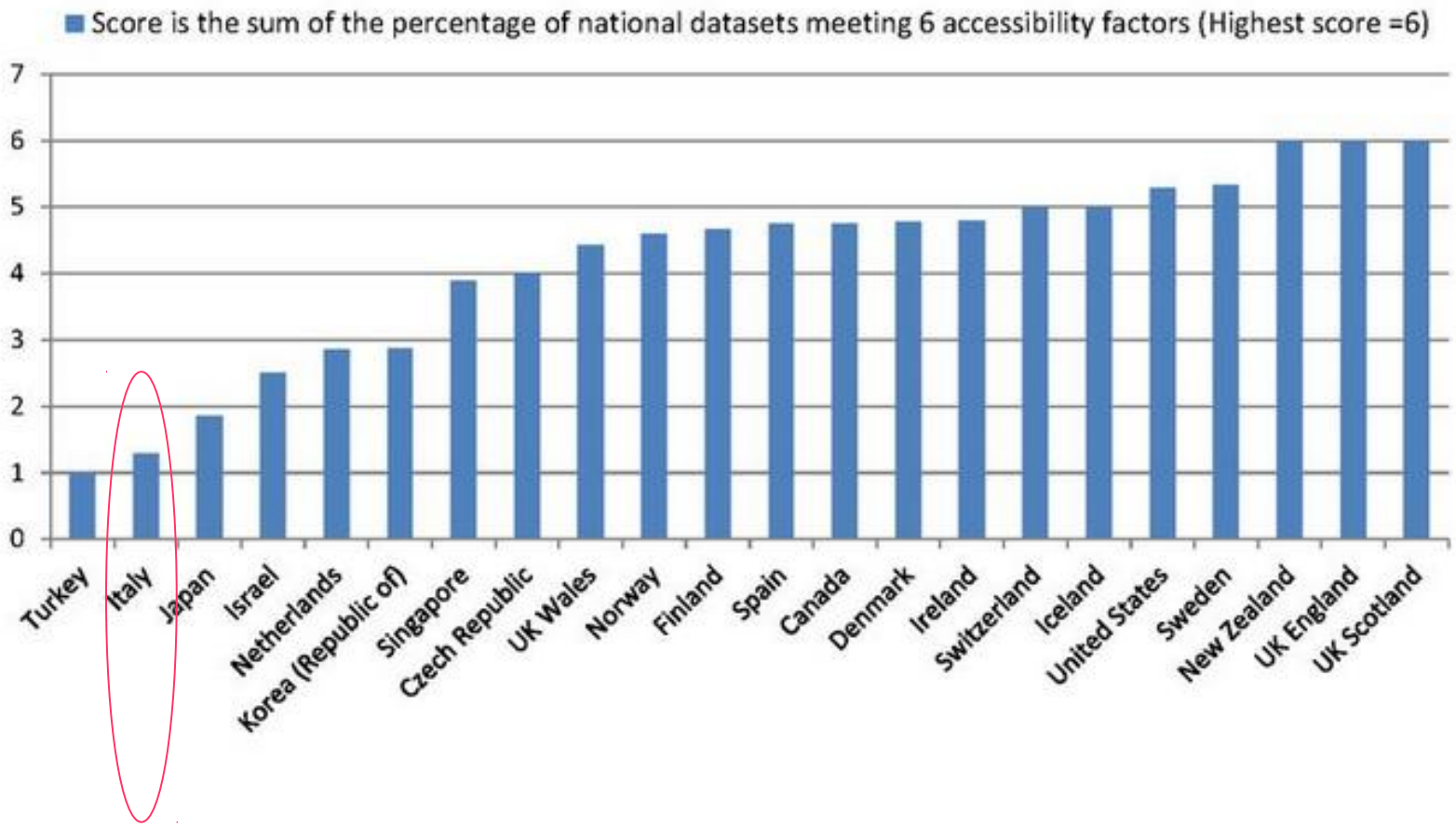


Source: National Vascular Registry. 2013 Report on Surgical Outcomes. Consultant level Statistics. June 2013 c

Fabrizio Carinci
UNIVERSITY OF SURREY

Accessibilità dei dati sanitari

Figure 3.1. Sharing and accessibility of health data for approved statistical and research uses



SAIL DATABANK

Contents lists available at ScienceDirect

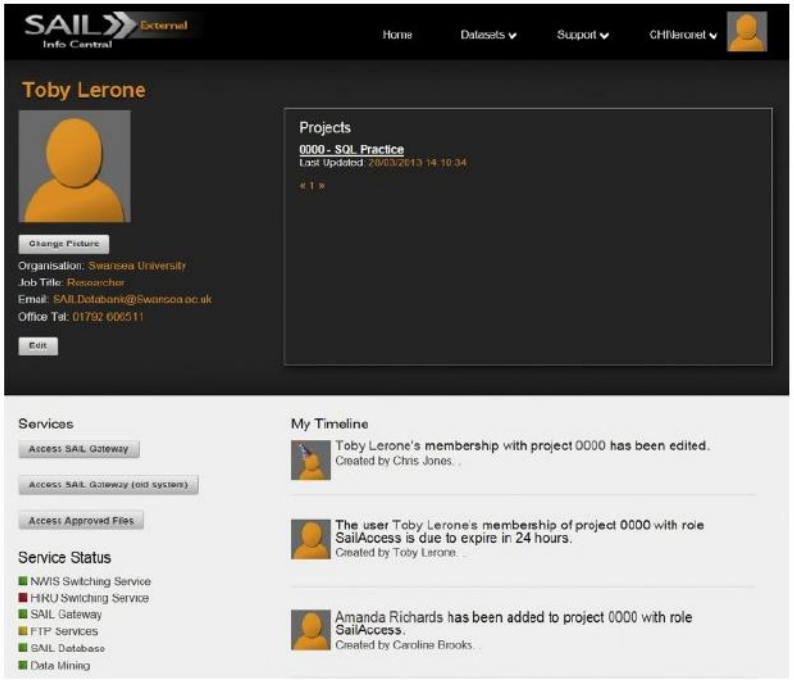
Journal of Biomedical Informatics

journal homepage: www.elsevier.com/locate/yjbin

A case study of the Secure Anonymous Information Linkage (SAIL) Gateway: A privacy-protecting remote access system for health-related research and evaluation ☆

Kerina H. Jones *, David V. Ford, Chris Jones, Rohan Dsilva, Simon Thompson, Caroline J. Brook
Martin L. Heaven, Daniel S. Thayer, Cynthia L. McNerney, Ronan A. Lyons

College of Medicine, ILS2, Swansea University, Swansea, Wales SA2 8PP, UK



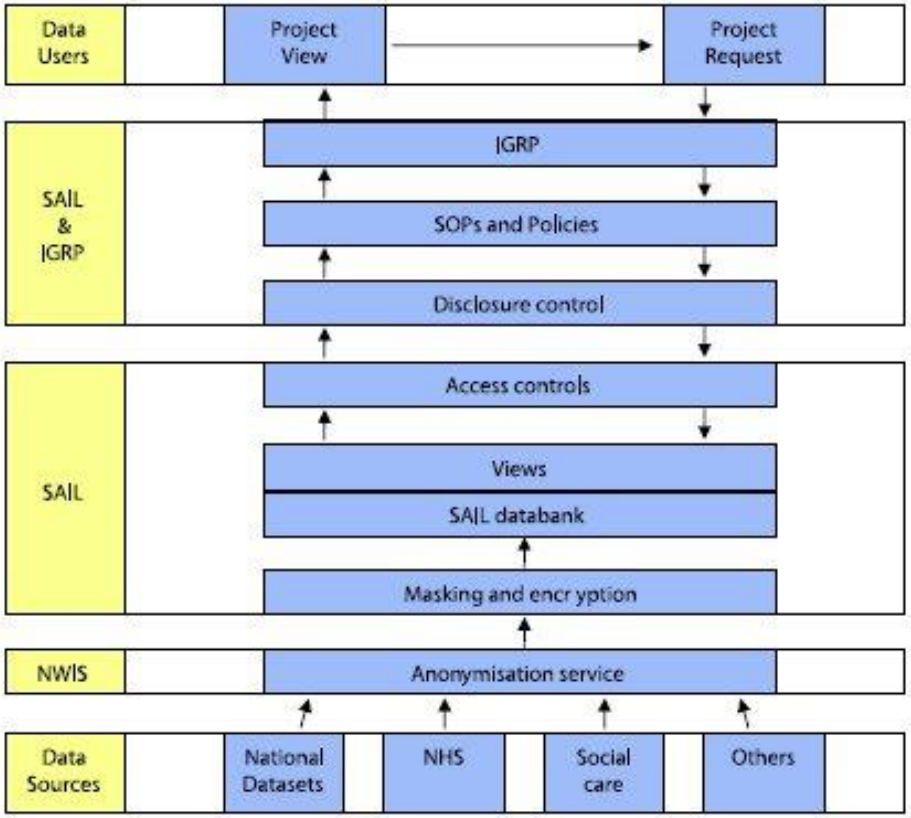
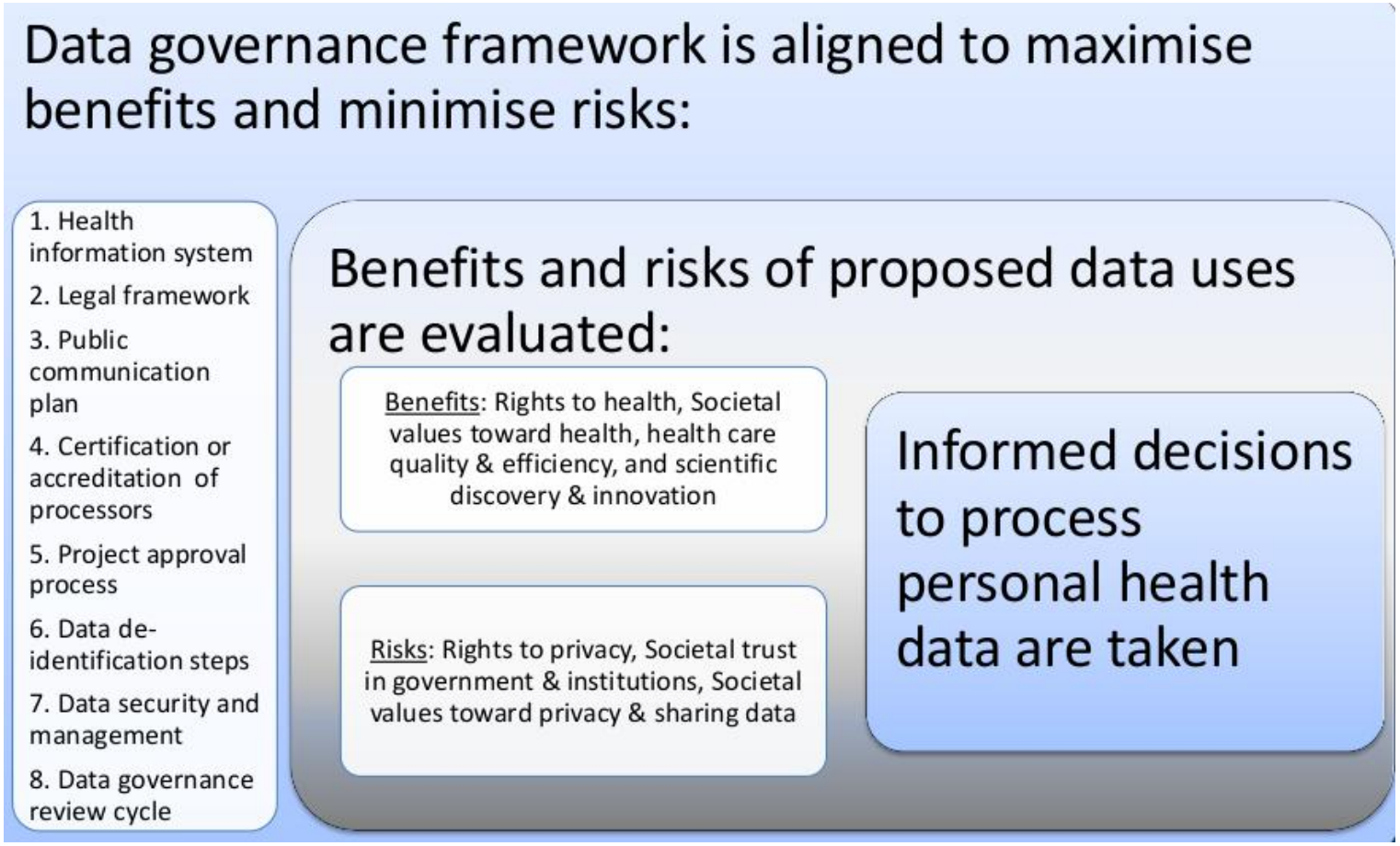


Fig. 1. SAIL architecture. This diagram shows the SAIL databank system and the controls in place for data acquisition and utilisation, with an indication of the roles carried out by each party. Beginning at the base of the diagram, SAIL has formal agreements with data providers to provide their data to the databank in accordance with Information Governance. The commonly-recognised identifiers are anonymised at NWIS, who provide a trusted third party service to SAIL. Further processes of masking and encryption are carried out at SAIL, and the SAIL databank is constructed. From the top of the diagram, requests to use the data are reviewed by SAIL and an independent Information Governance Review Panel (IGRP) to assess compliance with Information Governance before access can be allowed. Once this is agreed, a data view is created by SAIL staff, and access to this view can be made available via the SAIL Gateway. For this to happen, further data transformations are carried out to control the risk of disclosure, and the data user signs an access agreement for responsible data utilisation, in accordance the specifications of the IGRP to comply with Information Governance.

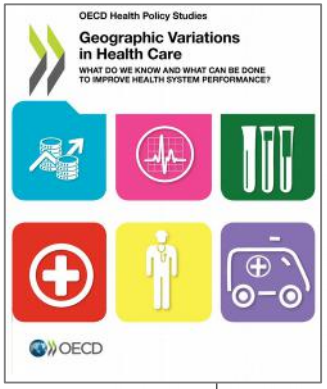
OECD 2015 - Health Information Infrastructure

Elementi essenziali della governance dei dati

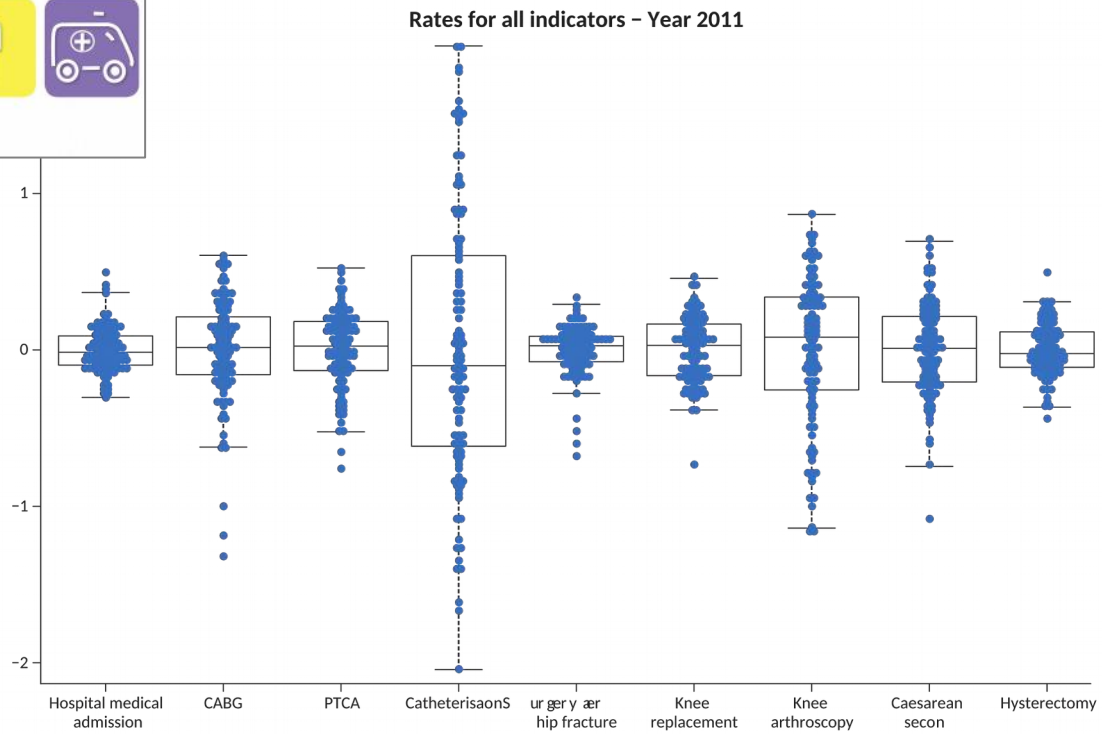
http://www.oecd.org/els/health-systems/Item-1-Access-to-data-and-privacy-Jillian-Oderkirk-OECD.pdf



Rapporti sulla variabilità della pratica clinica



Turnip charts of log-standardised rates for all health care procedures and activities, by province, Italy, 2011

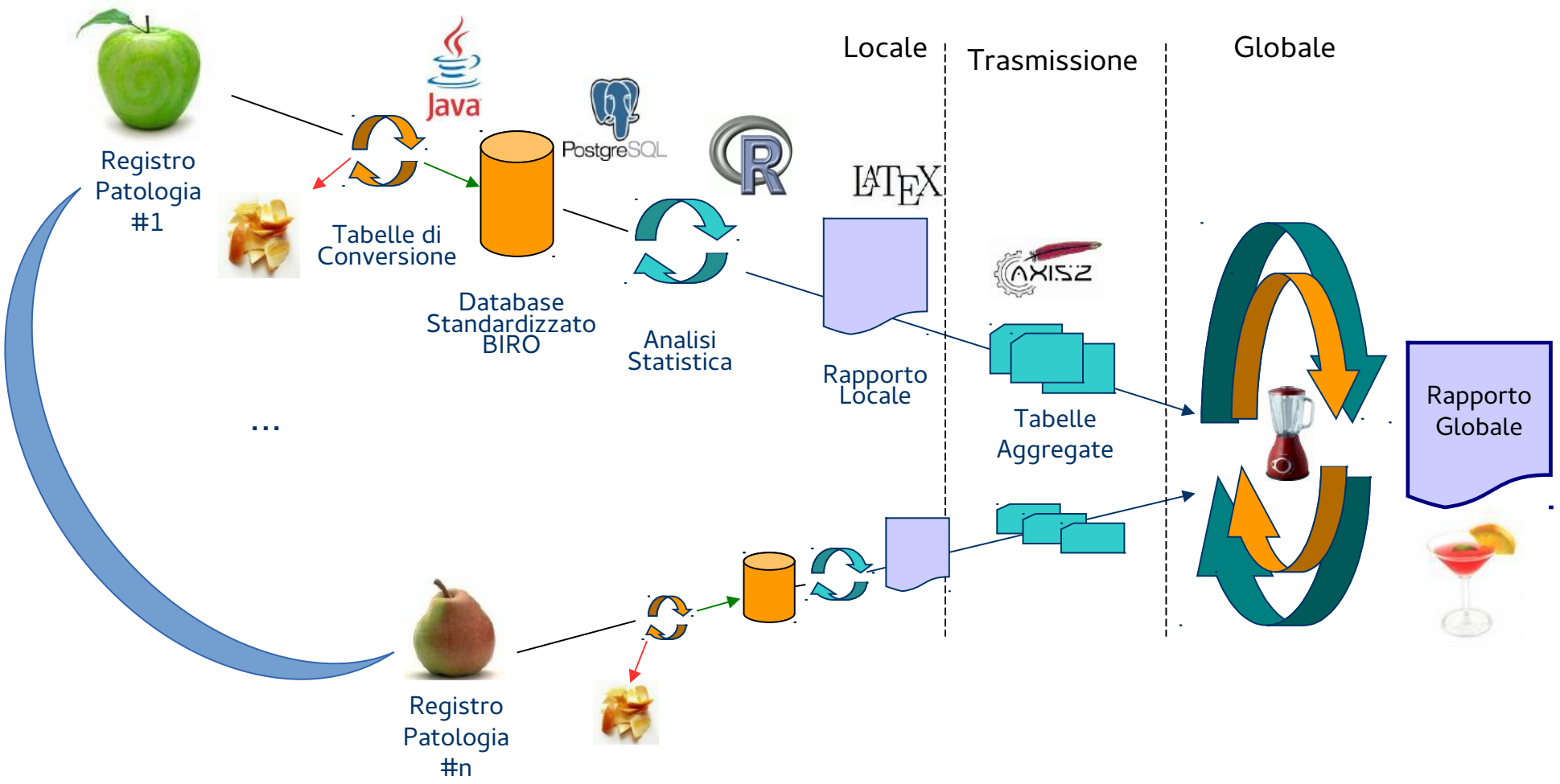


Source: Authors' estimates based on National Hospital Discharges Database, Ufficio VI, DG Programmazione sanitaria, Ministero della Salute, Italy.

Fabrizio Carinci
UNIVERSITY OF SURREY

Il sistema BIRO

http://www.eubirod.eu



Argomenti

1. **Perchè valutare la Performance dei sistemi sanitari?**
2. Perchè c'è bisogno delle Scienze Statistiche?
3. Che si sfide si aprono con i “Big Data”?
4. Quale futuro per le Statistiche della Salute?

Triplo scopo (“Triple Aim”)

QUALITA' DELLA CURA	SALUTE	COSTI

CREATE INTEGRATED PRACTICE UNITS (IPUs)

Organize care around patient medical conditions and distinct patient segments.

MEASURE OUTCOMES

Measure health outcomes for every patient.

MEASURE COSTS

Measure the actual costs of patient care.

BUNDLED PRICES

Reimburse the full care cycle for medical conditions.

SYSTEMS INTEGRATION

Clinically integrate care across separate units and facilities using an IPU structure.

GEOGRAPHIC EXPANSION

Increase the geographic reach of leading providers in their areas of excellence.

BUILD AN ENABLING INFORMATION TECHNOLOGY PLATFORM

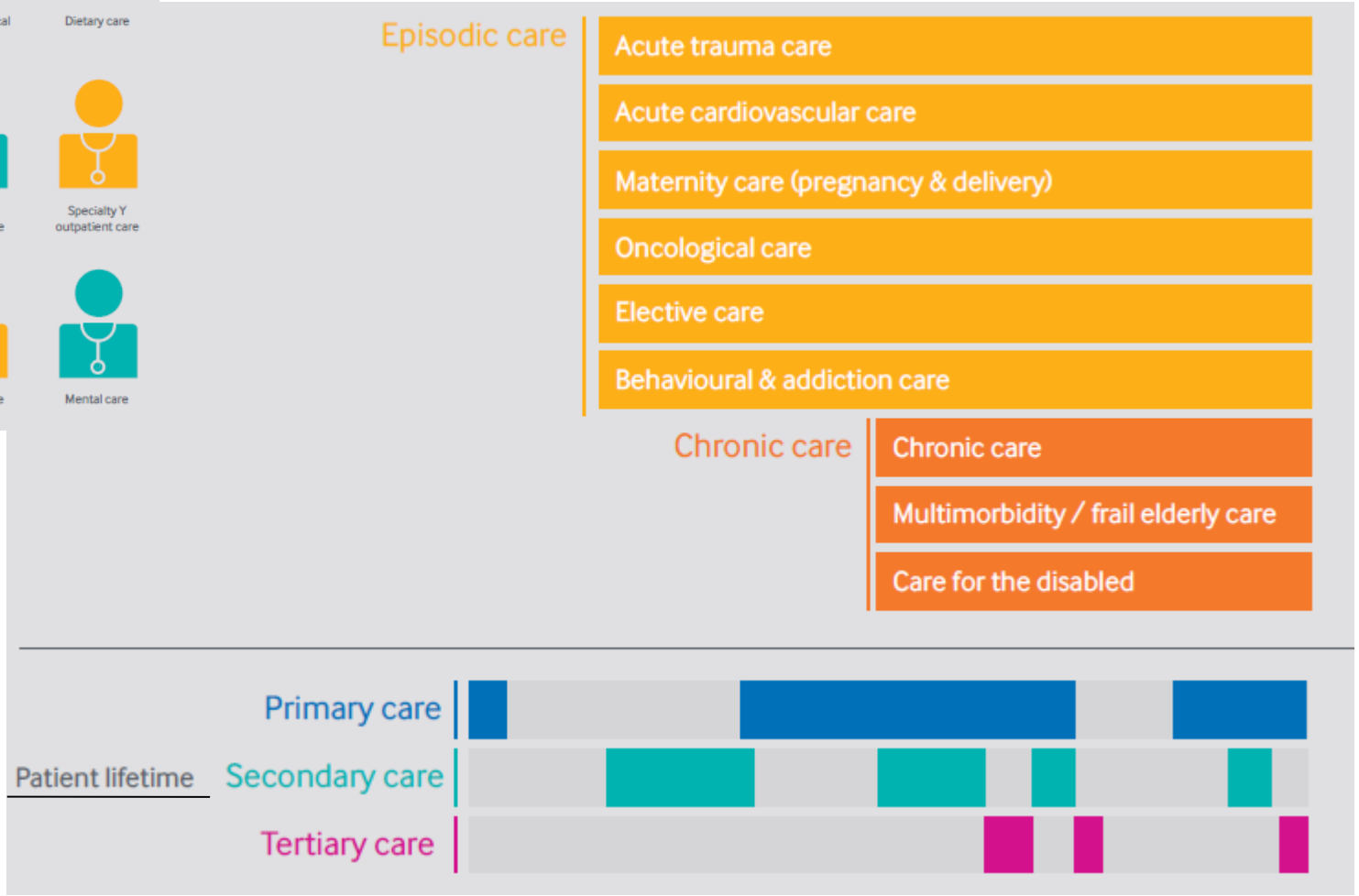
Use information technology to help restructure care delivery and accurately measure results.

Value-Based Health Care Delivery

http://www.isc.hbs.edu/health-care/vbhcd/Pages/default.aspx

Person-centred care

Providers



Fabrizio Carinci
UNIVERSITY OF SURREY

Il futuro delle statistiche sanitarie

- Patient-Reported Outcome Measures" (PROMs)
  - Misurano le percezioni dei pazienti sul loro stato di salute, esiti clinici, mobilità e qualità della vita. Esempi: qual'era il livello di mobilità di un paziente prima della frattura del femore, ed è migliorato dopo l'intervento? La condizione del paziente lo limita nel fare attività quali corsa, sci o bicicletta?
- Patient-Reported Experience Measures (PREMs)
  - Misurano le percezioni dei pazienti sulla loro esperienza di cura, focalizzandosi sui processi di cura e sull'impatto che hanno sull'esperienza dei pazienti. Esempio: il paziente ha dovuto aspettare molto per un trattamento? Si è sentito coinvolto nelle decisioni cliniche?
- "Patient Activation Measures" (PAMs)
  - Misurano fino a che punto i pazienti si attivano nel migliorare e mantenere la loro salute attraverso il self-management
- "Patient-Reported Incident Measures" (PRIMs)
  - Misurano gli incidenti riportati dai pazienti su aspetti di sicurezza

Conclusioni: può la statistica influenzare (e migliorare) le politiche sociali?

- Limitatamente – se si occupa solo di numeri
- Moderatamente – se si occupa anche di metodi e sistemi
- In maniera determinante – se si occupa anche di:
    - Qualità
    - Valori
    - Equità
    - Persone
    - Fenomeni, politiche e decisioni

…contribuendo alla pari in gruppi multidisciplinari

Evidence-based public policy?

"There is nothing a government hates more than to be well-informed: for it makes the process of arriving at decisions much more complicated and difficult."

John Maynard Keynes

The Times (March 11, 1937); Collected Writings, vol. 21, p. 409