Un approccio globale all'antimicrobicoresistenza

Maria Luisa Moro

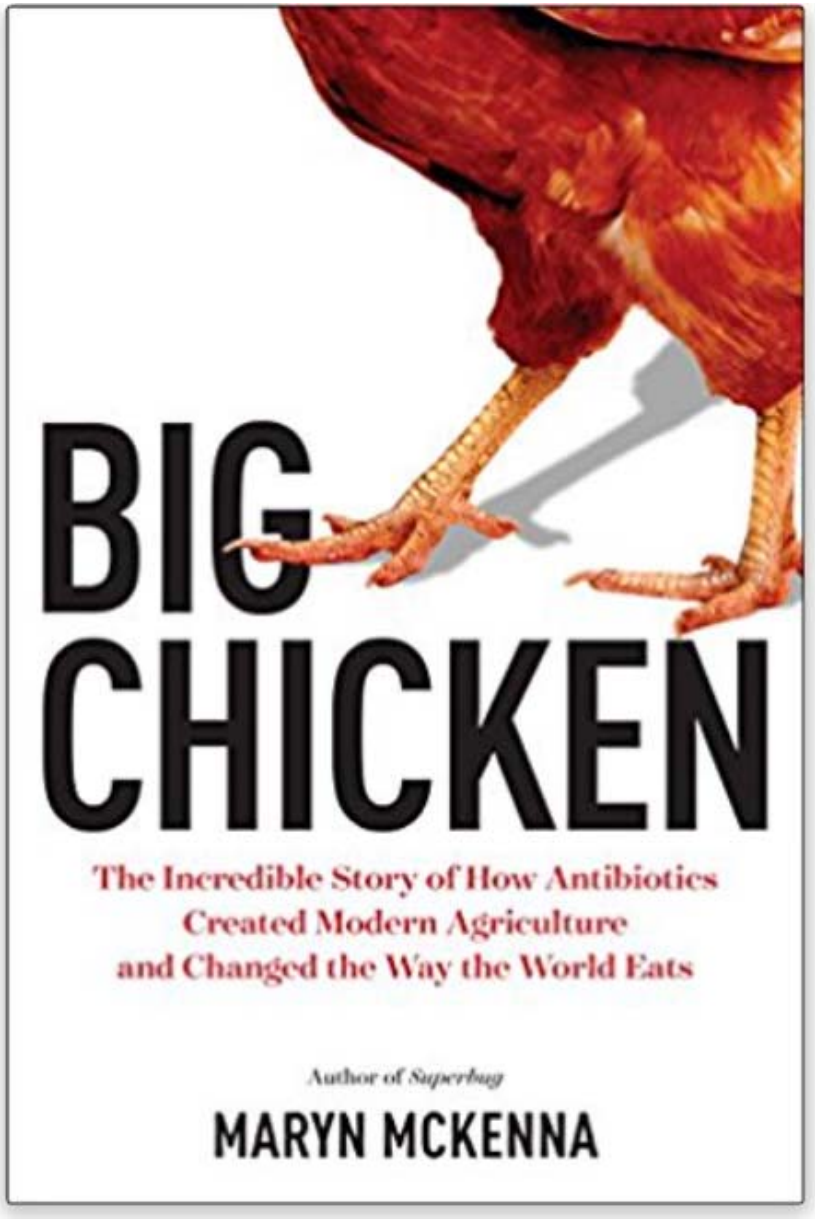
«*La resistenza antibiotica è una* ***condizione ecologica collettiva del tardo industrialismo»***

•Gli antibiotici sono diventati **biologici indutrializzati,** infrastrutturali alla produzione di altre cose. **Più** salute, **più** carne, **più** frutta, **più** chirurgia, **meno** decessi, **più** fertilità

•La scala della produzione è la scala della resistenza. Milioni di tonnellate ogni anno.

Landecker H. Antibiotic resistance and the biology of history. Body and Society 2015

In 1948, a scientist fed chicks a tiny dose of a new antibiotic, setting off a cascade of consequences — from drug resistance to factory farming

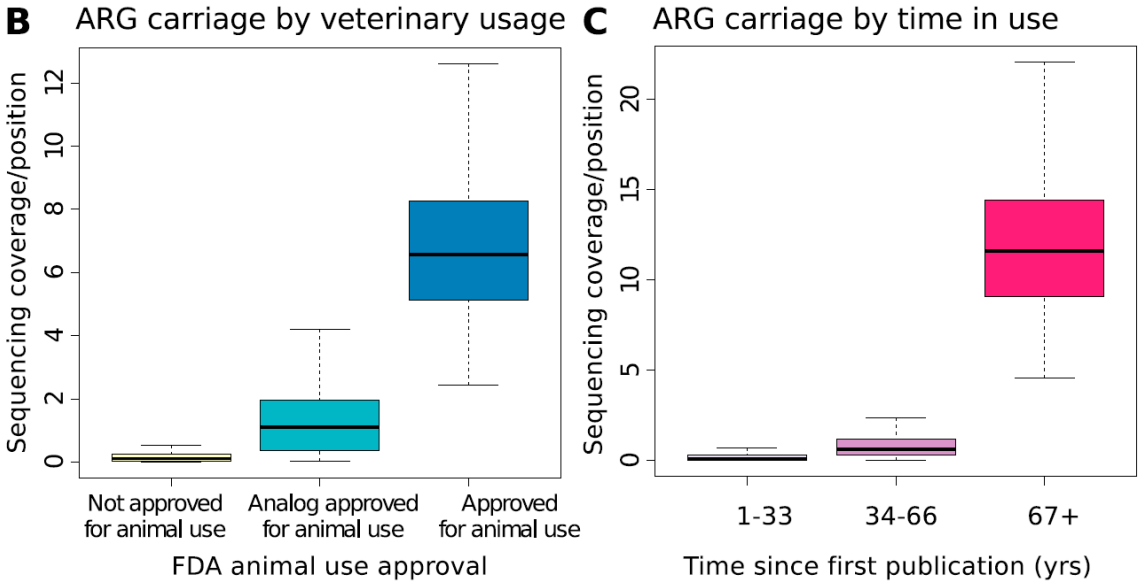


«*La resistenza antibiotica è una* ***condizione ecologica collettiva del tardo industrialismo»***

- Il tracciare il trasferimento orizzontale dei geni rappresenta **la registrazione storica dell'uso di antibiotici nell'uomo** iscritta nella biologia dei batteri

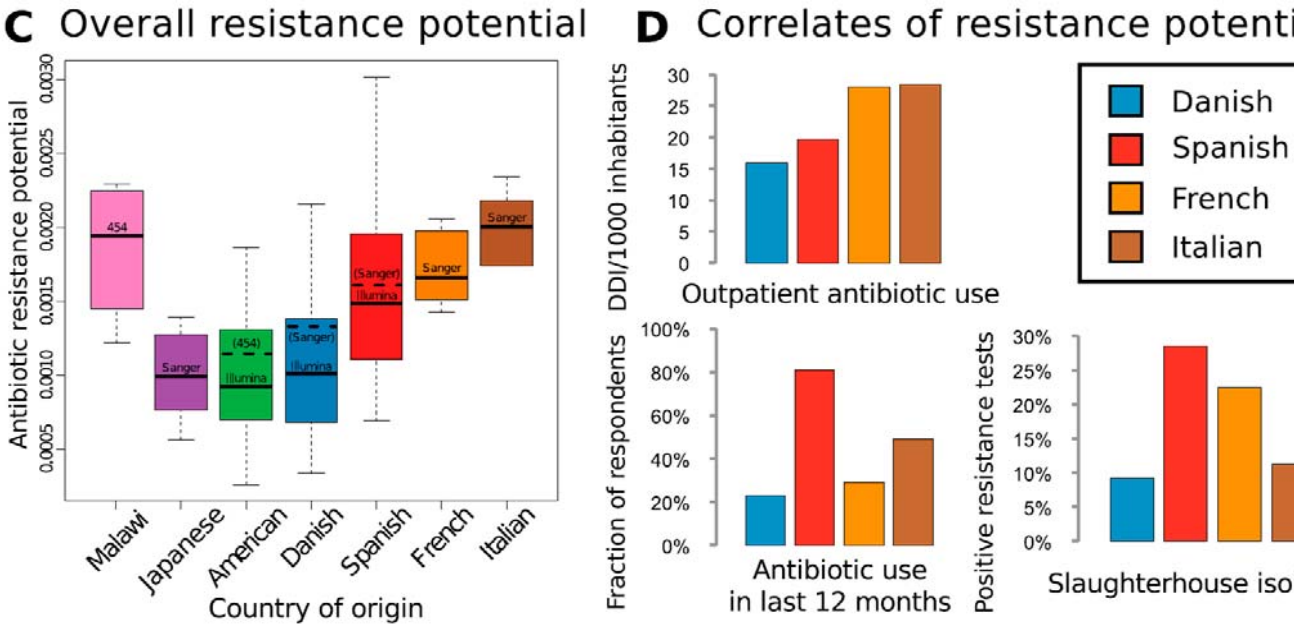
- Eventi e processi storici umani si sono **materializzati come eventi biologici** *(i nostri commensali, i nostri patogeni, i nostri parassiti, i nostri animali domestici e pesci e i loro commensali…….partecipano oggi tutti alla ecologia antibiotica).*

Landecker H. Antibiotic resistance and the biology of history. Body and Society 2015



Veterinary

Human



Kristoffer Forslund et al.
Genome Research 2013

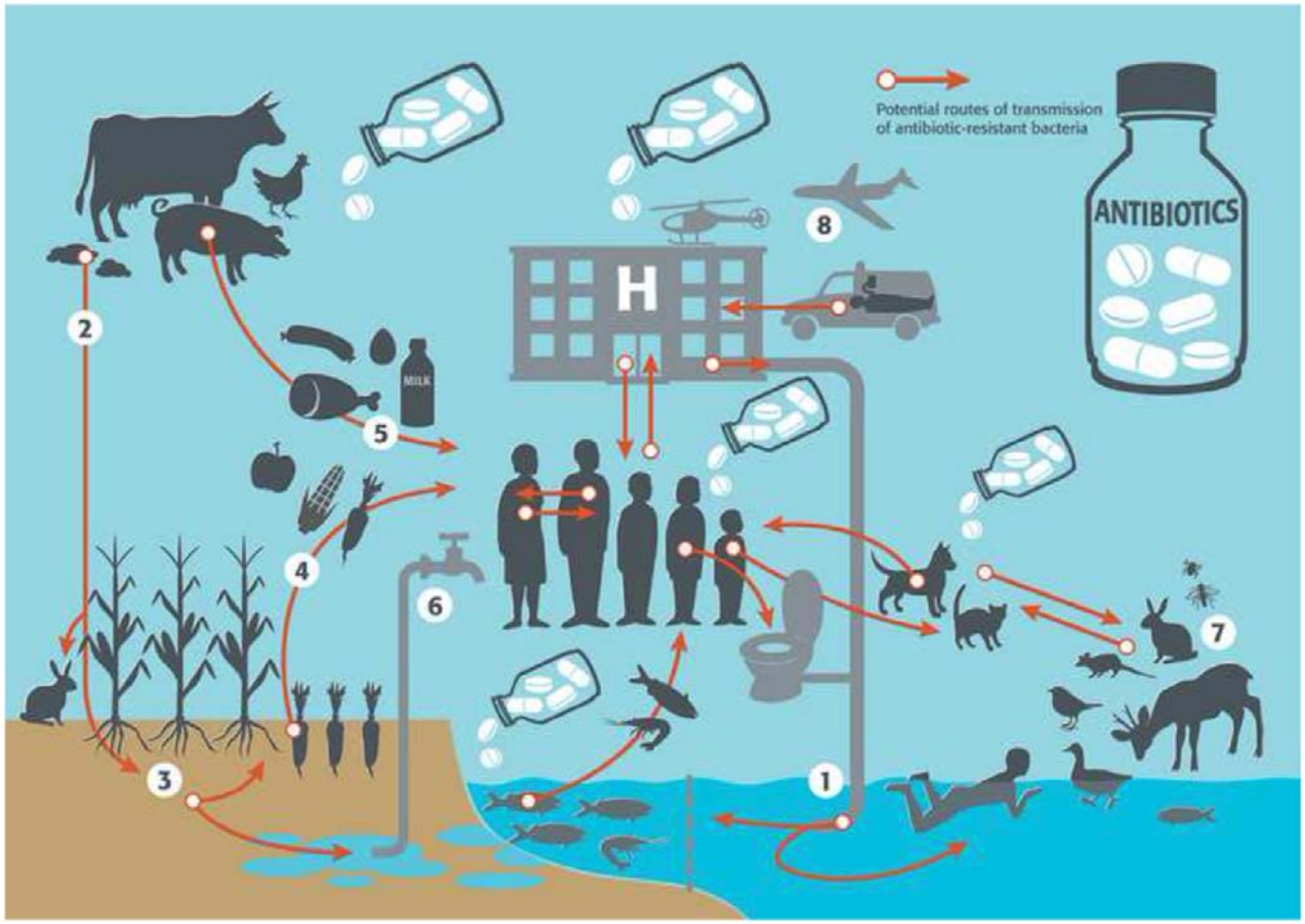
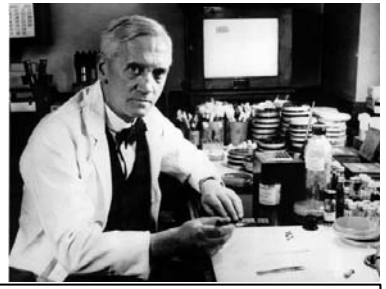


Fig. 2 Potential routes of transmission of antibiotic-resistant bacteria. Legend: Humans in the community or in hospitals, pets, livestock and fish farms rely on similar classes of antibiotics to fight infectious diseases. Both pathogenic and non-pathogenic bacteria evolve or exchange the ability to survive when exposed to these antibiotics. They spread into the environment through different routes, such as water sanitation systems (1), as wastewater treatment facilities do not entirely remove antibiotic resistant bacteria before releasing water into the environment. Another common route is through the application of manure to fields with cultivated crops (2), where antibiotic resistant bacteria can readily develop on the plants (3). The uptake of these resistant bacteria can then happen through the food chain, when humans later consume these plants (4) or the contaminated flesh of animals and fish harbouring resistant bacteria (5). As bacteria can easily reach water reserves, water distribution infrastructure is also a potential route for the spread of these germs (6). Even wildlife, insects and other bugs are potential carriers of antimicrobial resistance (7). Tourism, migrations and food imports (8) are nevertheless reported as the fastest way of spreading resistant strains of bacteria across borders. At the healthcare facilities level, resistant bacteria can spread by contact between patients or with healthcare staff, or through contaminated surfaces and medical devices. *Reproduced with permission from bioMérieux (modified)*

Harbarth et al. Antimicrobial Resistance and Infection Control (2015) 4:49

Cronaca di un disastro annunciato



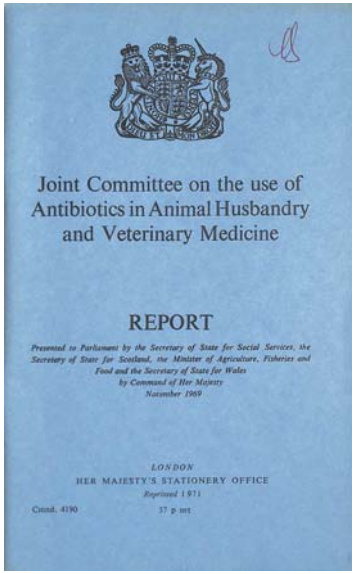
ALEXANDER FLEMING

Penicillin

Nobel Lecture, December 11, 1945

"It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them……..

Starr & Reynolds (California University) *"antibiotic-resistant flora in the poultry population are obvious"*



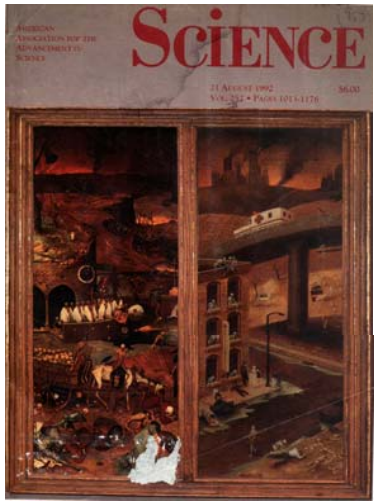
Joint Committee on the use of Antibiotics in Animal Husbandry and Veterinary Medicine

REPORT

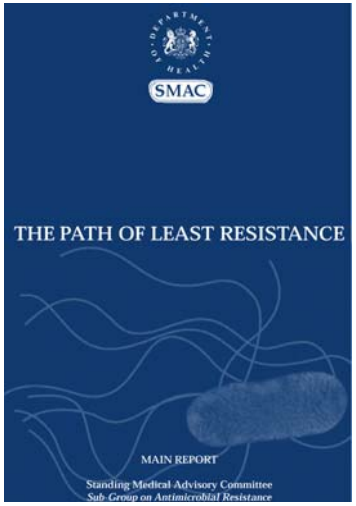
Presented to Parliament by the Secretary of State for Social Services, the Secretary of State for Scotland, the Minister of Agriculture, Fisheries and Food and the Secretary of State for Wales by Command of Her Majesty November 1969

LONDON
HER MAJESTY'S STATIONERY OFFICE
Reprinted 1971

The **Swann Report** proposes that rising rates of multi-drug resistant bacteria are due to agricultural use.



Has the era of untreatable infections arrived?



The **SMAC Report "The path of least resistance"**

1945 1951 1969 1992 1998

Complacency prevailed: another drug could always be found

Landecker H. Antibiotic resistance and the biology of history. Body and Society 2015

Antibiotic resistance – the three keys to control

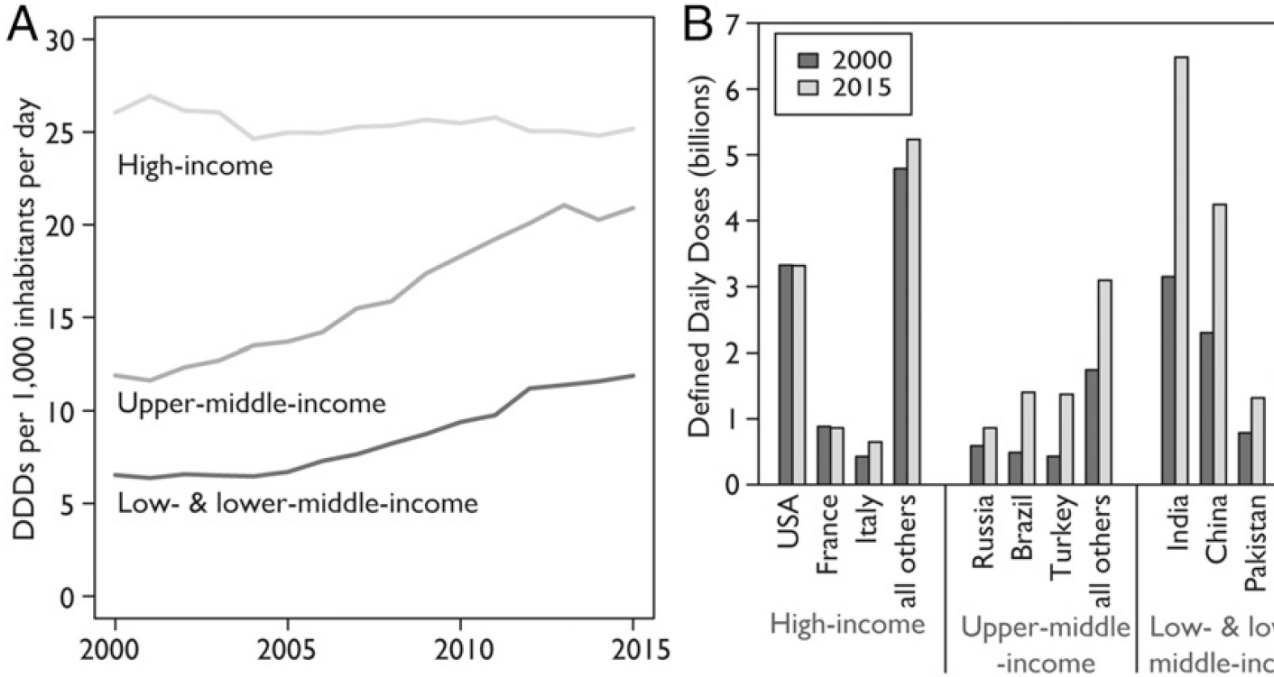
- Infection Control
- Antibiotic stewardship
- Surveillance
  - Antibiotic-resistant bacteria
  - Antibiotic usage

Control of antibiotic resistance is like a three-legged stool – if you take away one of the legs – the whole thing falls over!

Global increase and geographic convergence in antibiotic consumption between 2000 and 2015

Eili Y. Klein[a,b,c,1], Thomas P. Van Boeckel[d], Elena M. Martinez[a], Suraj Pant[a], Sumanth Gandra[a], Simon A. Levin[e,f,g,1], Herman Goossens[h], and Ramanan Laxminarayan[a,f,i]

- ✓ Retail and hospital sectors data for 76 countries from 2000 through 2015
- ✓ Between 2000 and 2015, antibiotic consumption, expressed in defined daily doses (DDD), increased 65% (21.1–34.8 billion DDDs), and the antibiotic consumption rate increased 39% (11.3–15.7 DDDs per 1,000 inhabitants pe day).



Klein EY et al PNAS 2018

Global increase and geographic convergence in antibiotic consumption between 2000 and 2015

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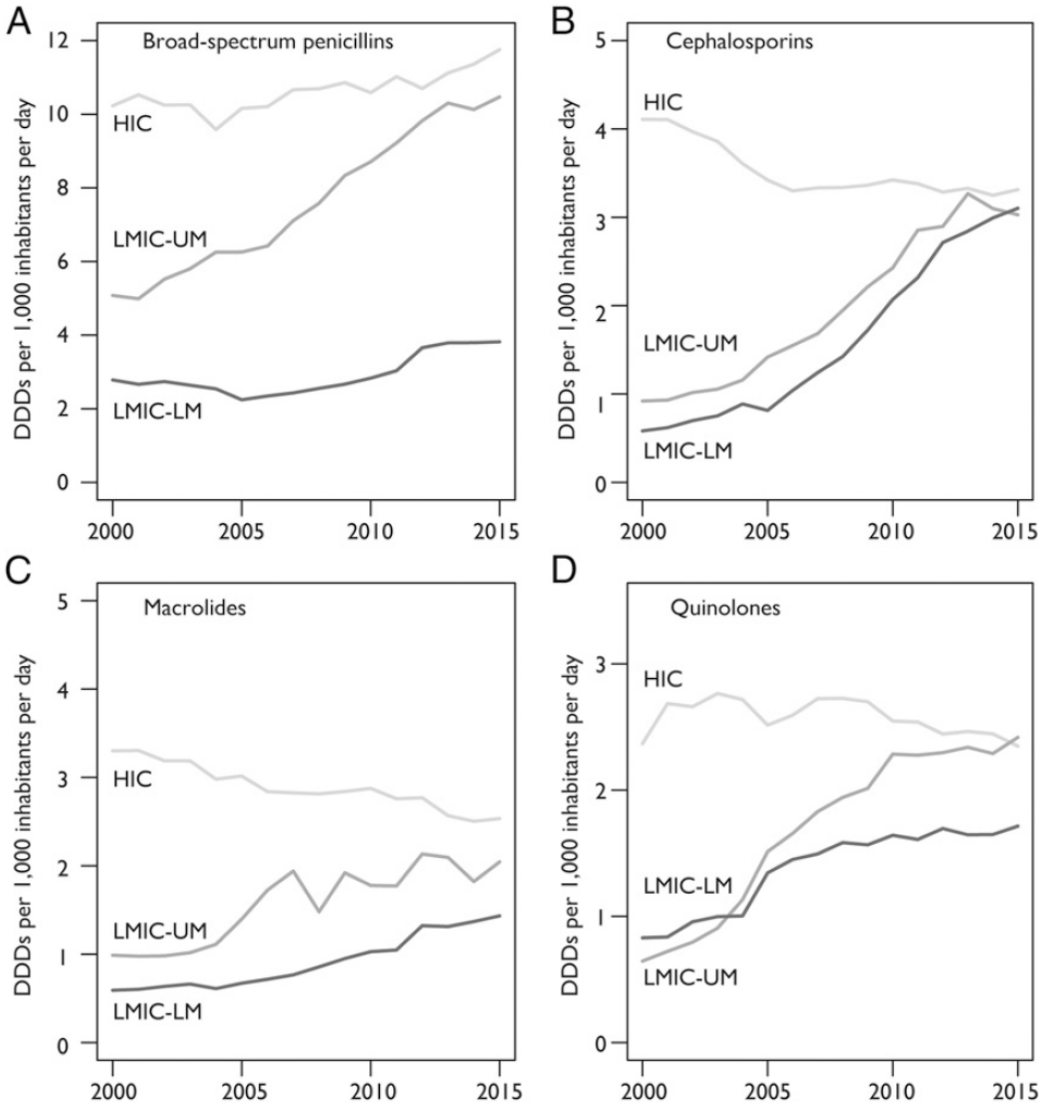
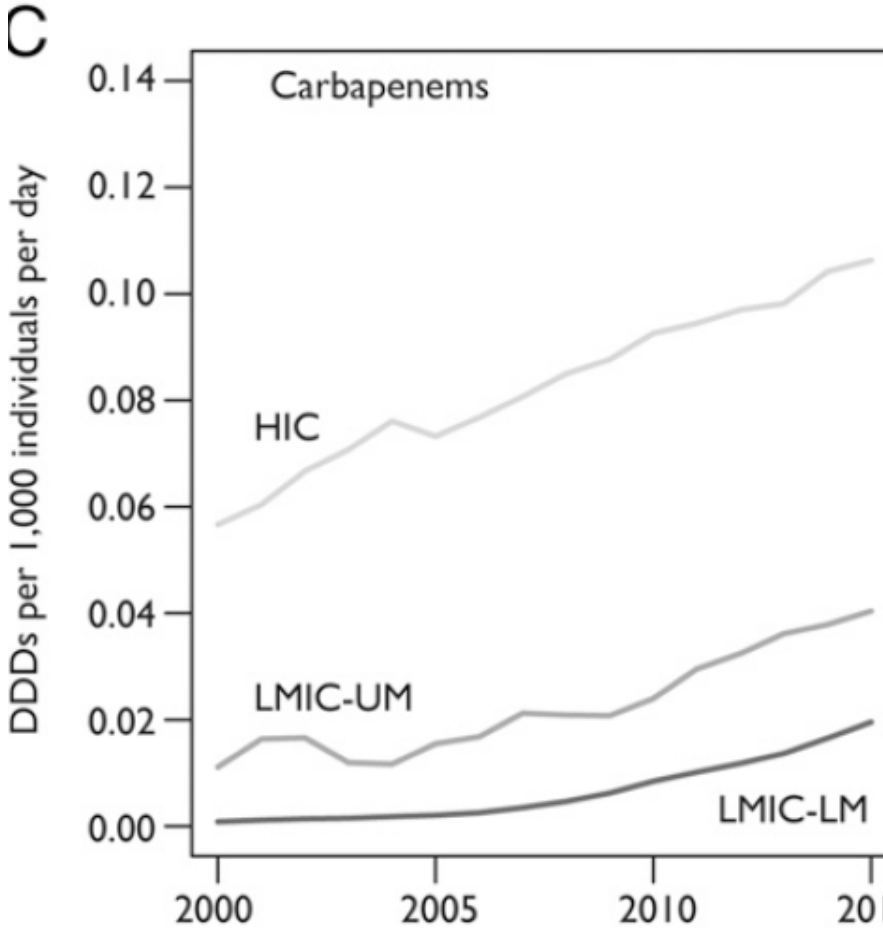




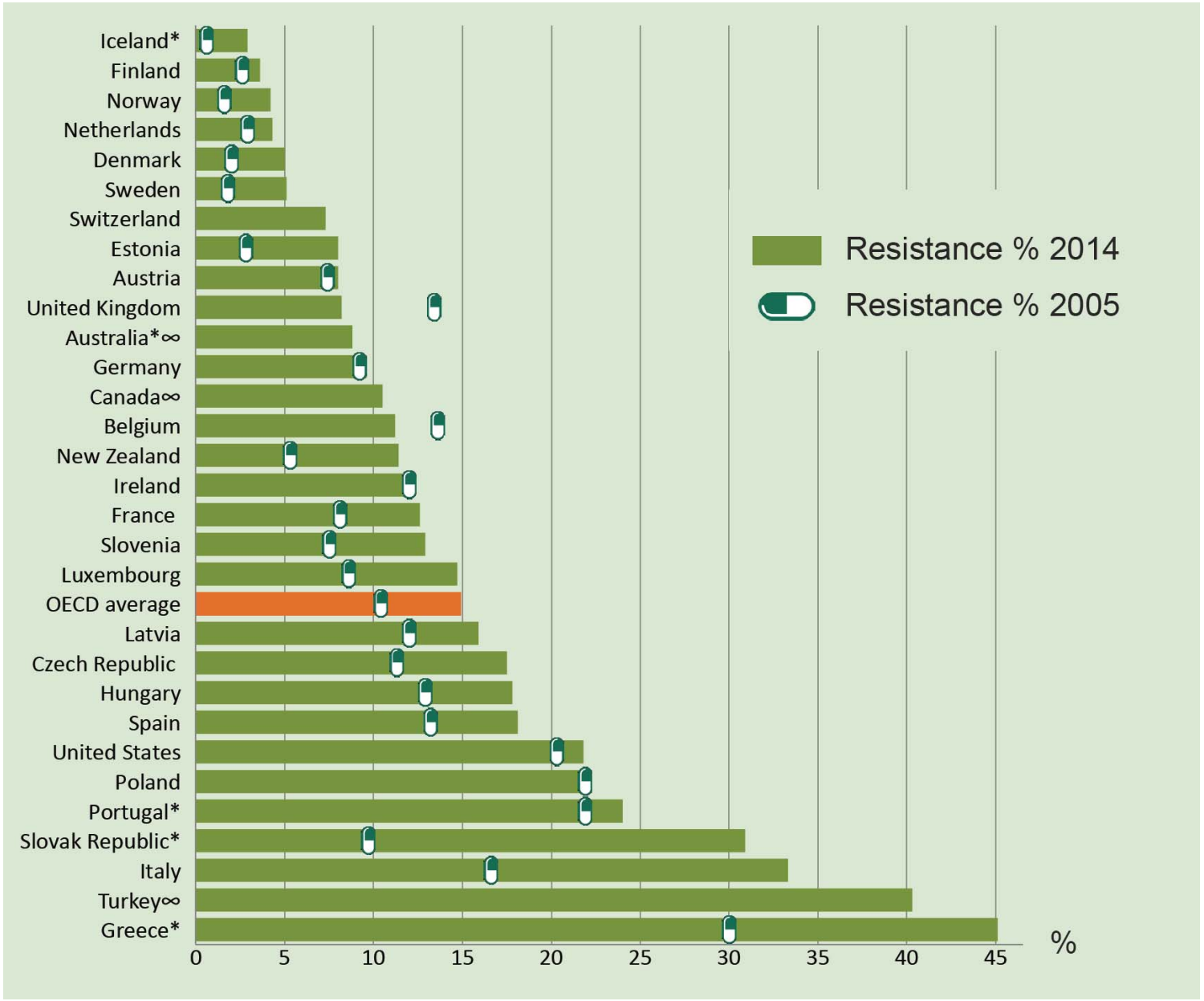
Klein EY et al PNAS 2018

Global infection prevention and control priorities 2018–22: a call for action

*Many health systems **fail to build strong foundations to reduce the risks and spread of health-care-associated outbreaks**. They also tolerate an **unacceptably poor level of IPC** in everyday practice.*

It is now urgent to consider IPC capacity building and actual implementation as global health priorities.

Benedetta Allegranzi et al. Lancet ID 2

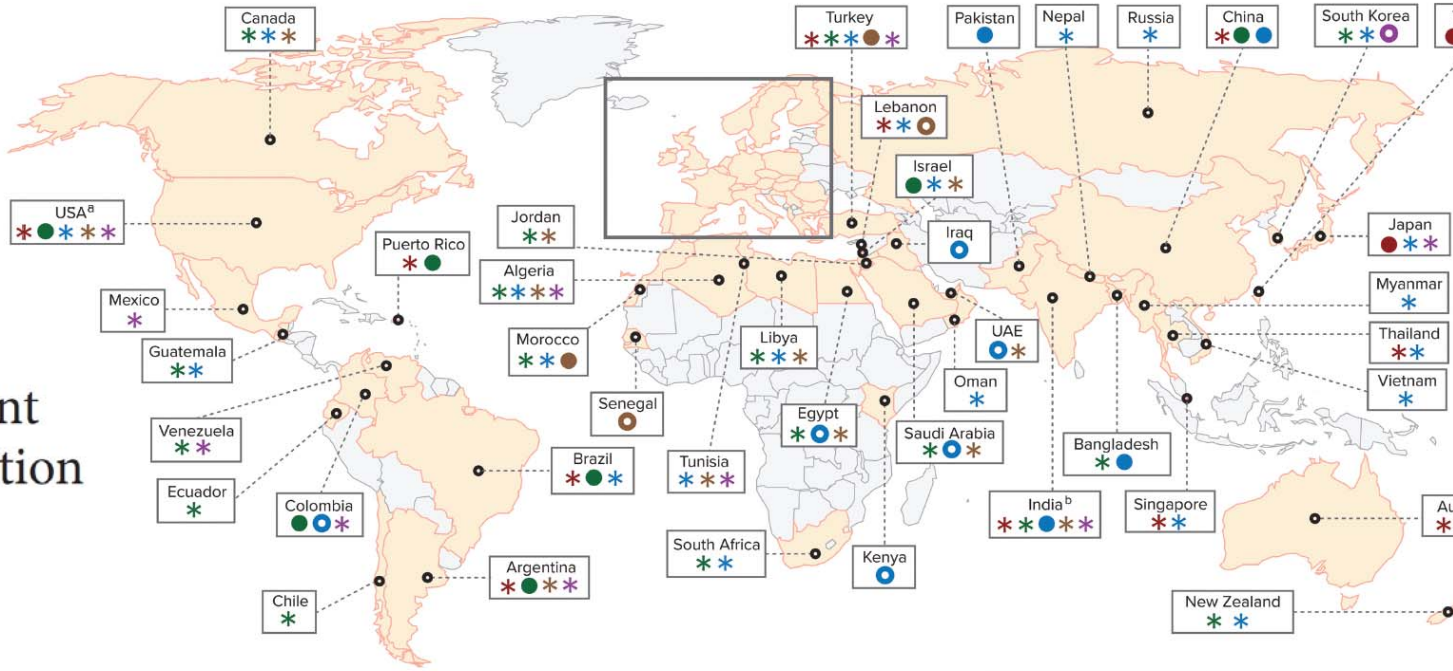


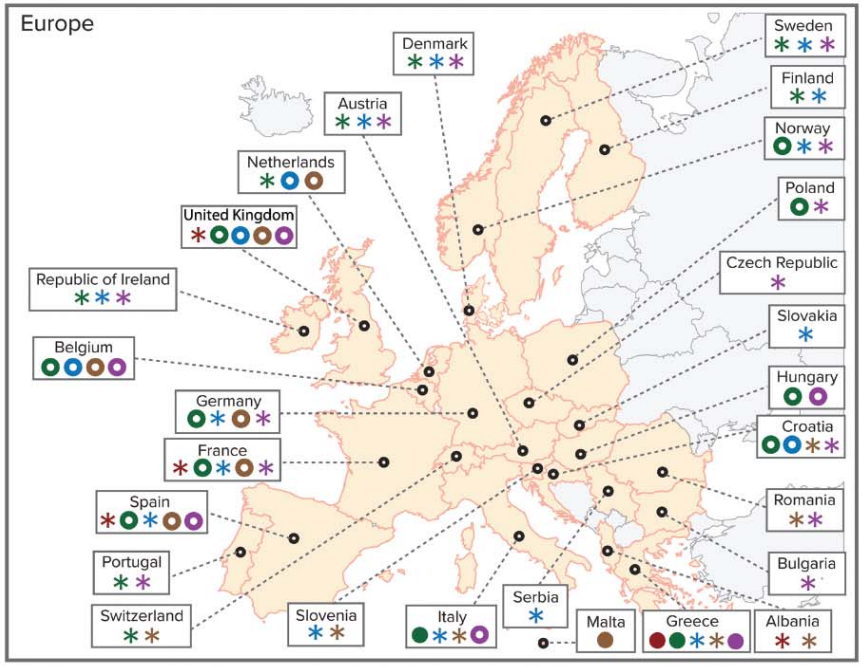
OECD 2016 Policy Brief

pidemiology of Carbapenem-Resistant
obacteriaceae: The Impact and Evolution
Global Menace

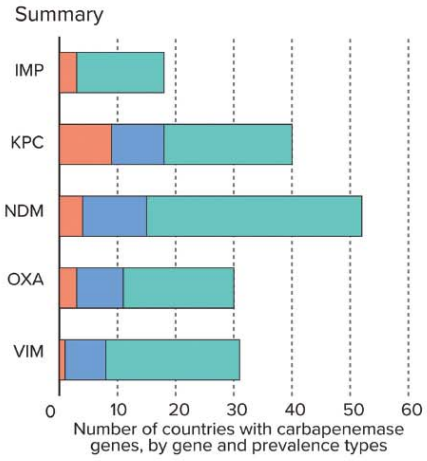
n[1,3] and Robert A. Weinstein[2,3]

n LK JID 2017:215 (Suppl 1)





	IMP	KPC	NDM	OXA
Endemic/nationwide distribution	●	●	●	●
Significant outbreaks/ regional spread	○	○	○	○
Sporadic outbreak/ occurences	*	*	*	*



Evolving beta-lactamase epidemiology in *Enterobacteriaceae* from Italian nationwide surveillance, October 2013: KPC-carbapenemase spreading among outpatients

T Giani [1,2], A Antonelli [2,3], M Caltagirone [4], C Mauri [5], J Nicchi [3], F Arena [1], E Nucleo [4], S Bracco [5], A Pantosti [6], The AMCLI-CoSA survey participants [7], F Luzzaro [5], L Pagani [4], GM Rossolini [1,3,8]

Distribution of the centers participating in the survey, Italy, October 2013 (n=14)

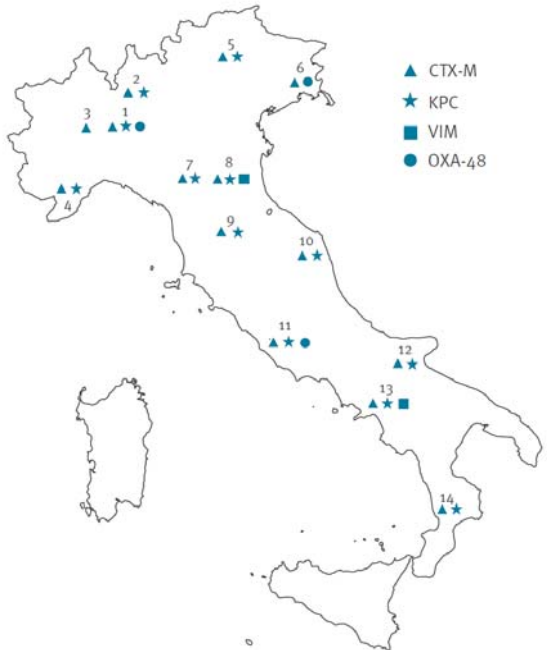


TABLE 2

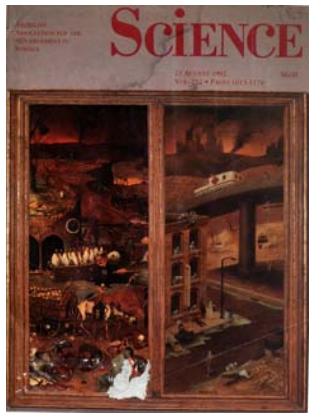
Proportions of ESCR-carbaS and ESCR-carbaR of *Enterobacteriaceae* by species included and origin of isolate, nationwide surveillance survey, Italy, October 2013 (n=3,324

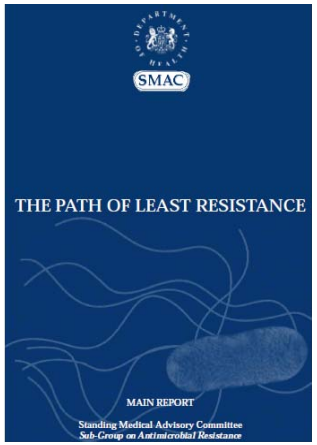
Species	Isolates from inpatients							Isolates from outpatients							All isolates					
	Total	ESCR	%	ESCRcarbaS	%	ESCRcarbaR	%	Total	ESCR	%	ESCRcarbaS	%	ESCRcarbaR	%	Total	ESCR	%	ESCRcarbaS	%	ESCRcarb
Escherichia coli	920	230	25.0	219	23.8	11	1.2	1,432	162	11.3	159	11.1	3	0.2	2,352	392	16.7	378	16.1	14
Klebsiella pneumoniae	437	159	36.4	49	11.2	110	25.1	260	36	13.8	16	6.2	20	7.7	697	195	28.0	65	9.3	130
Proteus mirabilis	152	39	25.7	39	25.7	0	NA	123	26	21.1	26	21.1	0	NA	275	65	23.6	65	23.6	0
Total target species	1,509	428	28.4	309	20.3	121	8.0	1,815	224	12.3	201	11.1	23	1.3	3,324	652	19.6	508	15.3	144

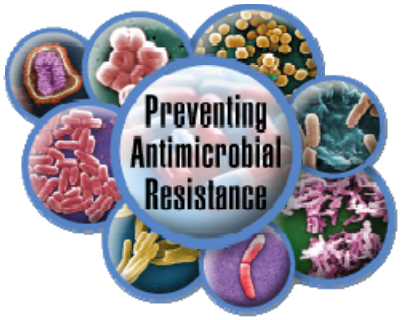
ESCR: non-susceptible to extended-spectrum cephalosporins; ESCR-carbaS: non-susceptible to extended-spectrum cephalosporins but susceptible to carbapenems; ESCR-carbaR: isolates non-susc
extended-spectrum cephalosporins and non-susceptible to carbapenems; NA: not applicable.

L’antibioticoresistenza rappresenta una vera emergenza di sanità pubblica

Gli anni ’90: ricercatori e singole istituzioni





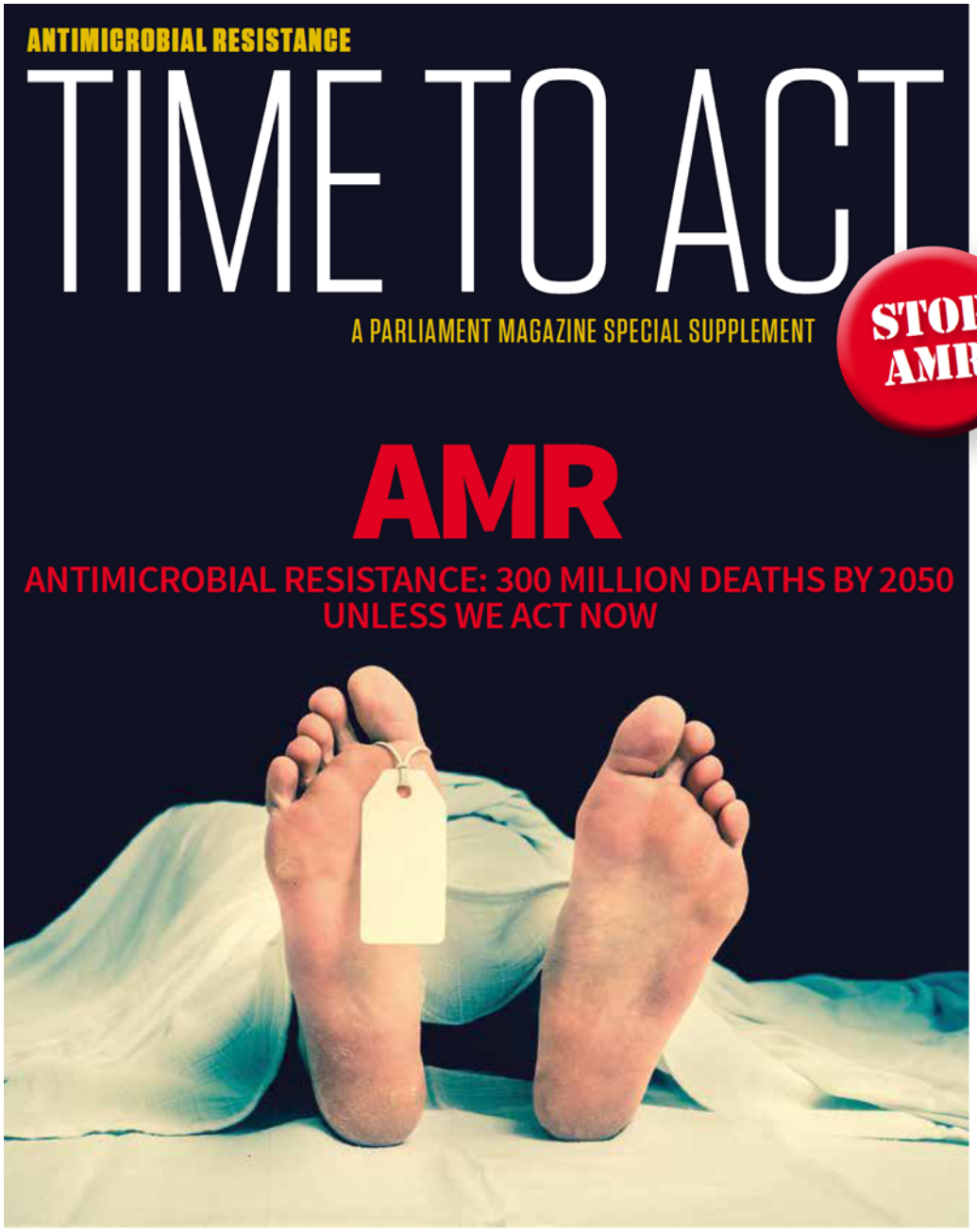


Gli anni ‘00: i governi (Europa e America del Nord)

‘Strategy against Antimicrobial Resistance'

Gli anni ‘10: l’impegno ‘globale’

Giornata mondiale della salute WHO, 7 aprile 2011



Parliament Magazine 11 September 2

European Commission

A European One Health Action Plan against Antimicrobial Resistance (AMR)

Review on Antimicrobial Resistance

Tackling drug-resistant infections globally

TACKLING DRUG-RESISTANT INFECTIONS GLOBALLY: FINAL REPORT AND RECOMMENDATIONS

THE REVIEW ON ANTIMICROBIAL RESISTANCE

CHAIRED BY JIM O'NEILL

MAY 2016

GLOBAL ACTION PLAN ON ANTIMICROBIAL RESISTANCE

European Commission

EU Guidelin for the prudent use antimicrobi in human health

Health and Food Safety

PORT TO THE PRESIDENT ON ATING ANTIBIOTIC RESISTANCE

Executive Office of the President

President's Council of Advisors on Science and Technology

September 2014

NATIONAL STRATEGY FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA

Vision: The United States will work domestically and internationally to prevent and control illness and death related to infections caused by antibiotic- resistant bacteria by implementing measures to mitigate the emergence and spread of antibiotic resistance and ensuring the continued availability of therapeutics for the treatment of bacterial infections.

September 2014

THE WHITE HOUSE

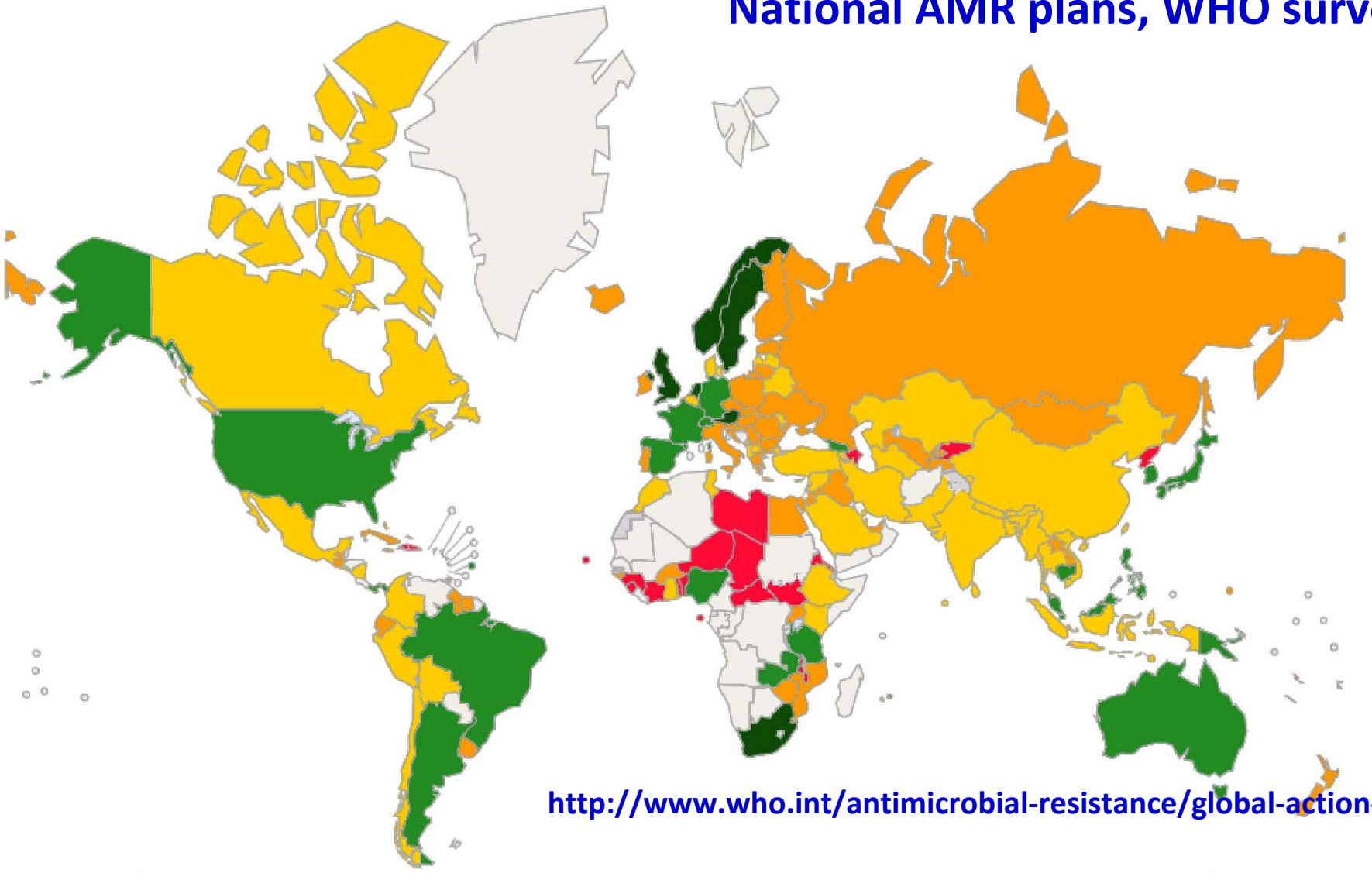
WASHINGTON

Piano Nazionale di Contrasto dell'Antimicrobico-Resistenza (PNCAR)

2017-2020

24 ottobre 2017

National AMR plans, WHO survey 2016

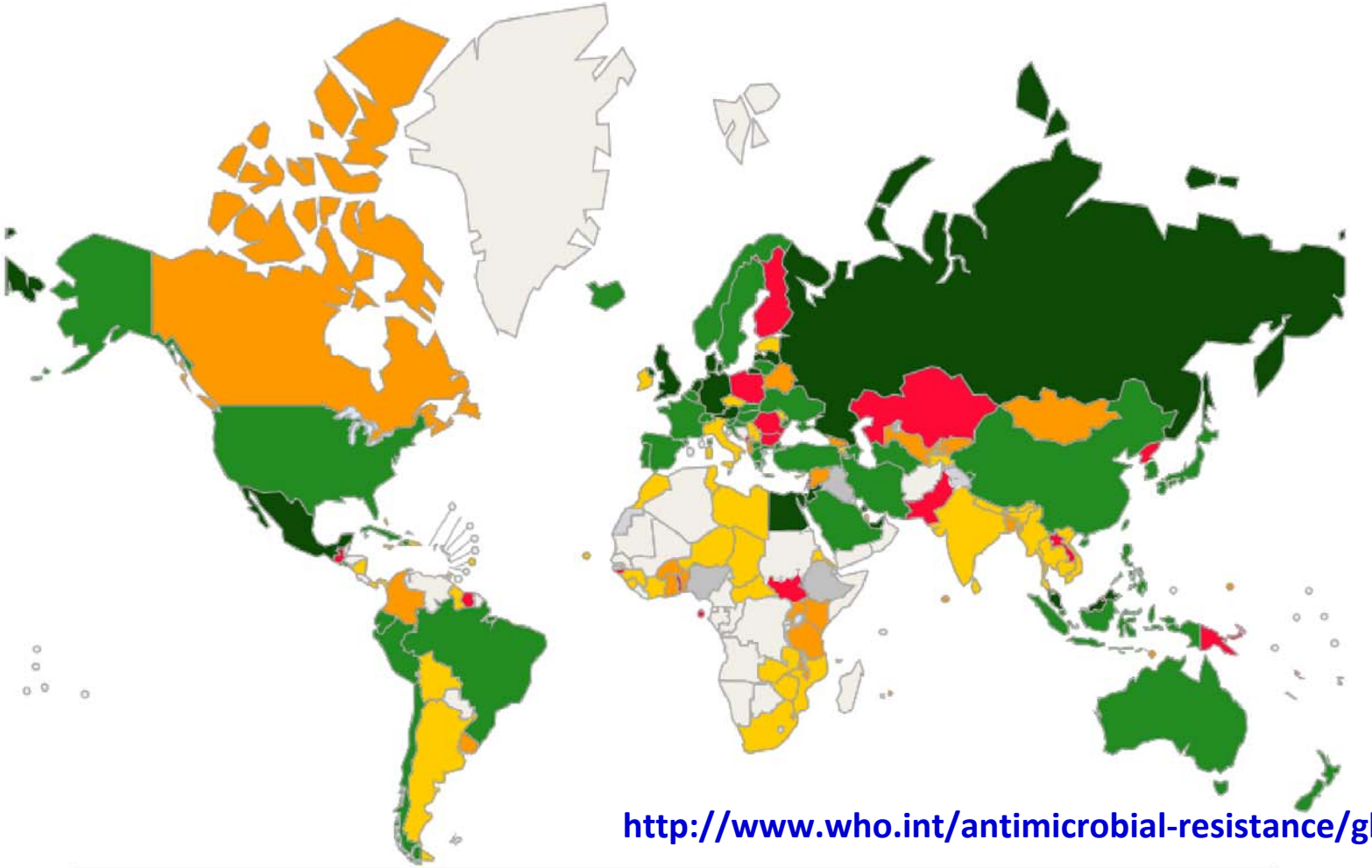


http://www.who.int/antimicrobial-resistance/global-action-plan/database/

5.1 Country progress with development of a national action plan on AMR

- A - No national AMR action plan.
- B - National AMR action plan under development or plan involves only one sector or ministry.
- C - National AMR action plan developed that addresses human health, animal health and other sectors.
- D - Multi-sectoral AMR action plan approved that reflects Global Action Plan objectives, with an operational plan and monitoring arrangements.
- E - Multi-sectoral AMR action plan has funding sources identified, is being implemented and has monitoring in place.

Infection Prevention and Control, WHO Survey 201

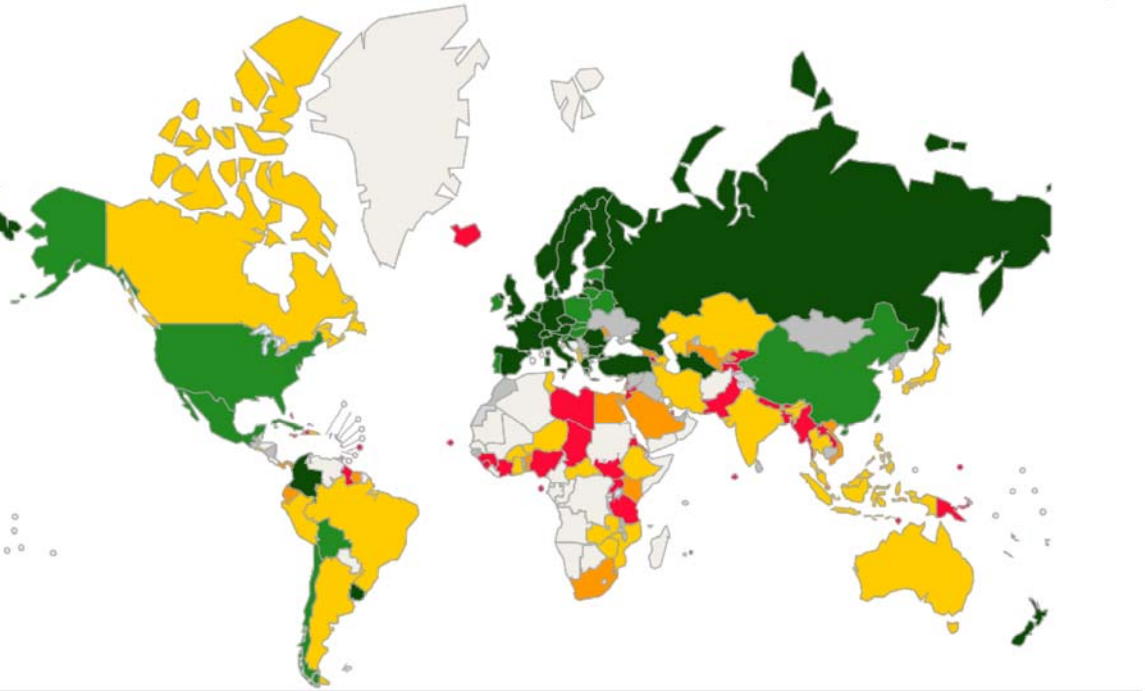


http://www.who.int/antimicrobial-resistance/global-action-plan/database/

8.1 Infection Prevention and Control (IPC) in human health care

- No data
- A - No national IPC policy or plan is available.
- B - A national IPC policy or operational plan is available, with standard operating procedures (SOPs), guidelines and protocols available to all hospitals.
- C - National IPC SOPs, guidelines and protocols are implemented in selected health-care facilities.
- D - Several infection control measures in IPC plans are implemented nationwide and monitored.
- E - All relevant infection control measures are implemented in all targeted health facilities. Compliance and effectiveness regularly evaluated and published.

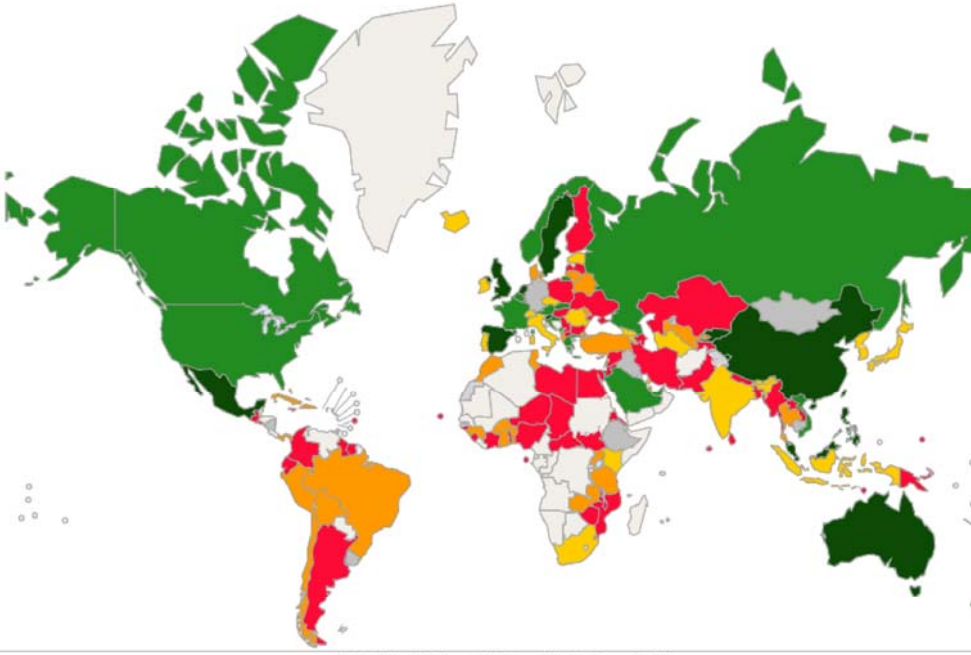
ntimicrobial stewardship in animal and crop, WHO Survey 2016



9.2 Antimicrobial stewardship & regulation in animal and crop production

al policy or legislation regarding the quality and efficacy of antimicrobials and their use in animals, and crops.
olicy for antimicrobial stewardship and governance developed, that addresses appropriate use, availability and quality of antimicrobials for animal use.
n and regulations approved on import, marketing authorisation, production, distribution and prudent use of high-quality veterinary medicinal products including antimicrobials, based on internatio..
tation of legislation and regulations on responsible and prudent use of antimicrobials in animals and ensuring safe food supplies. Prescriptions are required for antimicrobial use in animals. Use o..
bials given to animals are only used to control or treat infectious diseases, under veterinary supervision. Regulations are enforced on access to antimicrobials and their use in animals, crop produ..

Antimicrobial stewardship in hum health, WHO Survey 2016



9.1 Antimicrobial Stewardship & regulation in human health

No data
A - No/weak national policy & regulations for antimicrobial stewardship.
B - National policy and regulations for antimicrobial stewardship developed & approved, that address use, availability and quality of antibiotics in the community and in health care setting
C - National antimicrobial stewardship program is being implemented in some healthcare facilities. Planned legal/regulatory changes are being introduced to regulate access to antibiotic
D - Antimicrobial stewardship program is implemented in health care facilities nationwide. Legal/regulatory changes approved and publicised to regulate sales and products for human use
E - Antimicrobial stewardship program is implemented in most health care facilities and in community. Regulations are enforced on access to antibiotics and use in human health. Monito

http://www.who.int/antimicrobial-resistance/global-action-plan/databas

Strategic objectives

- Improve awareness and understanding
- Surveillance and research
- Effective sanitation, hygiene and infection prevention
- Optimize the use of antibiotics in human and vet medicine
- Sustainable investment for new medicines diagnostic tools and vaccines

World Health Organization 2015 Global action pla

IMPROVE AWARENESS AND UNDERSTANDING

The Silent Tsunami

“We have collectively failed to keep pace with the rise of antibiotic-resistant infections. Certain superbugs are now in the ascendency. We have now reached a critical point where AMR is jeopardising both human and animal health”

European health and food safety Commissioner Vytenis Andriukaitis

Parliament Magazine 11 September 201

Personal tragedy, collective responsibility

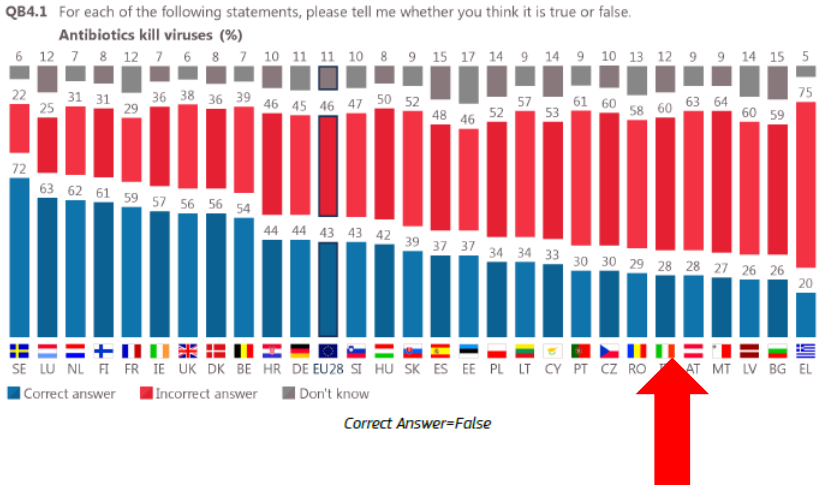
"Since containing AMR is a matter of collective responsibility… it is the moral duty of political leaders to make sure that we, collectively fulfil this responsibility… governments worldwide are under a moral obligation to regulate the use of antibiotics and farming"

Dr Hannah Maslen

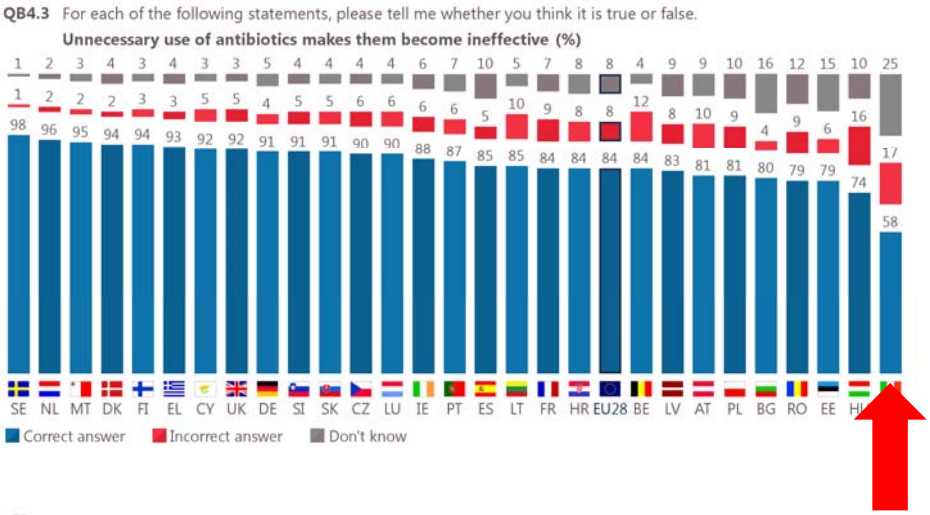
Parliament Magazine 11 September 2

Determinants: citizens' knowledge

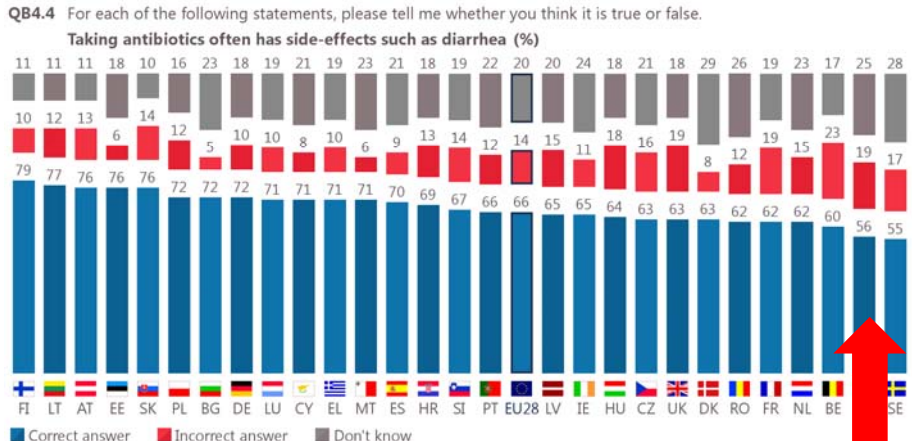
Gli antibiotici sono efficaci nei confronti dei virus?



L'uso non necessario di antibiotici li rende inefficaci?

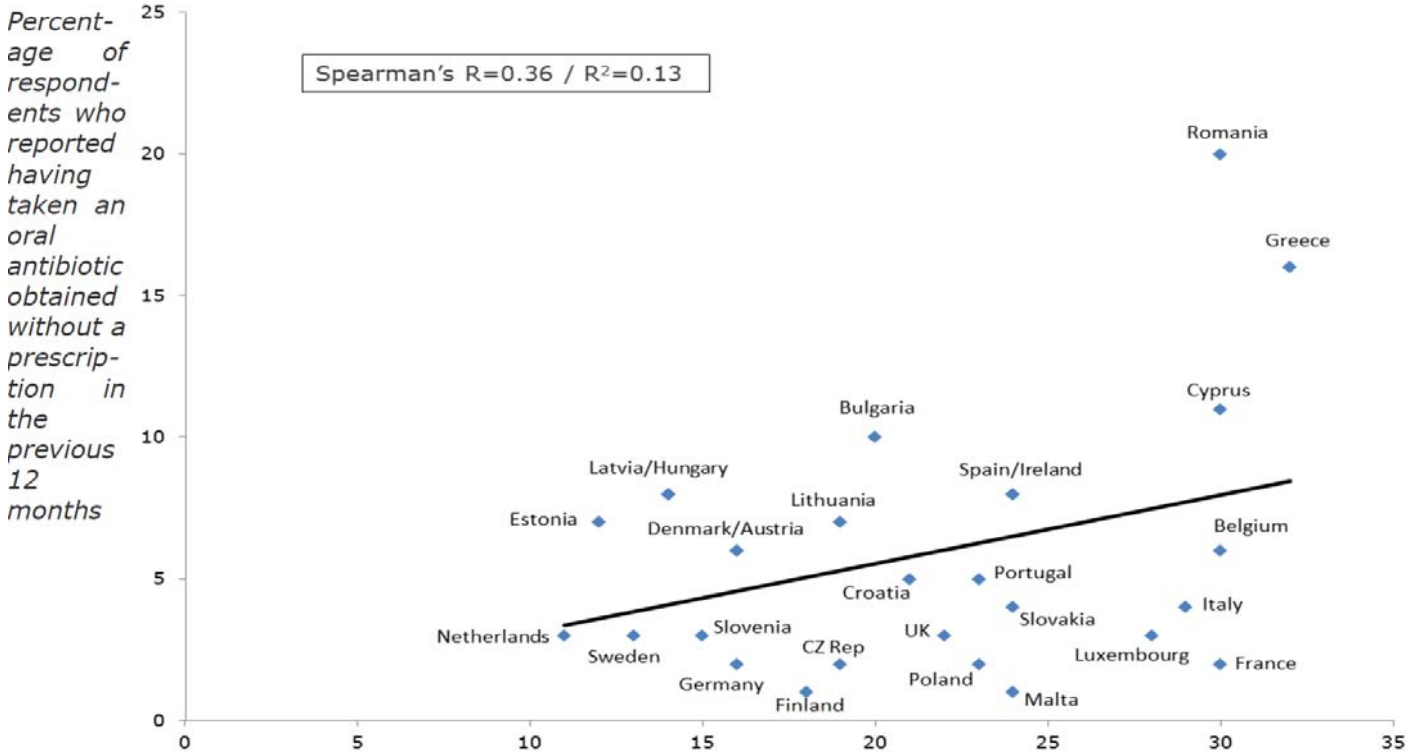


L'assunzione di antibiotici ha effetti collaterali?



Special Eurobarometer: Antimicrobial Resistance, April 2016

ANTIMICROBIAL RESISTANCE and causes of non-prudent use of antibiotics in human medicine in the EU



Amount of outpatient antibiotic consumption expressed in DDD/1 000 inhabitants/da

Table 2.6. Sources for obtaining antibiotics without a prescription. (*Source:* Literature review regarding the volume and nature of antibiotic use without a prescription (n = 59 studies).)

Country (1st author)	Year	Number of users	Pharmacy	Left-over medication	From family, friends, etc.	Other/ unknown
Denmark (Muscat)[34]	2006	66		64		36
Greece (Mitsi)[22]	2005	129	40.4	30.2	22.3	7.1
Greece (Skliros)[23]	2010	508	76.2	15.3	7.2	1.3
Italy (Napolitano)[37]	2013	137	43.2	68.6		
Lithuania (Berzanskyte)[25]	2006	298	86.0	23.2	6.1	
Malta (Borg)[38]	2002	168	85.7	4.8	4.8	4.8
Poland (Olczak)[39]	2006	122	?	56.4	18.2	
Poland (Muras)[40]	2013	372	13.4	73.1	12.6	0,01
Spain (Gonzales)[26] *(storage)*	2006	370	14.3	84.9	0.8	
Non EU-countries						
United States (Céspedes)[54]	2006	192	31	61		

Iniziative di advocacy

Campagne informative

Professor Dame Sally Davies warns that resistance to treatments a growing threat that could mean 'the end of modern medicine'

ELLA PICKOVER
Thursday 12 October 2017 23:23 BST

Antimicrobial Resistance: The End of Modern Medicine? with Dame Sally Davies

G20 GERMANY 2017

Berlin Declaration of the G20 Health Ministe

Together Today for a Healthy Tomorrow

Belgium's national campaigns (1999-2010)

- total number of antibiotic packages per 1000 inhabitants decreased from 3.6 in 199

2000 to 2.4 in 2009-2010 (-33%).

- Resistance of *S. pneumoniae* to penicillin decreased from 18% in 2000 to 7% in 2009
- Total cost for reimbursement of antibiotics decreased with 21 million Euro (-16.7%).

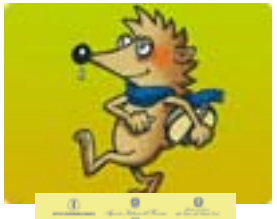
The cumulative savings between 2002 and 2009 were 90,154,345 Euro

- Costs of the six campaigns between 2002 and 2009 was 2.4 million Euro: **for every EUR invested in the campaign, 25 EUR were saved**.

Goossens H. Ann Clin Microbiol 2014;17(1):1-8

National information campaigns on prudent antibiotic use – Italian Medicine Agency

2008



"Antibiotics yes, but with caution"

2009

"Antibiotics? Use them cautiously"

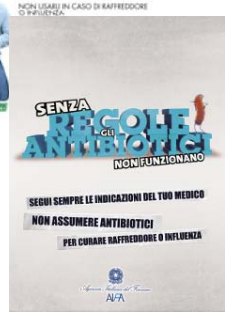
2010

"Antibiotics. Defend your defense. Use them cautiously "

2012

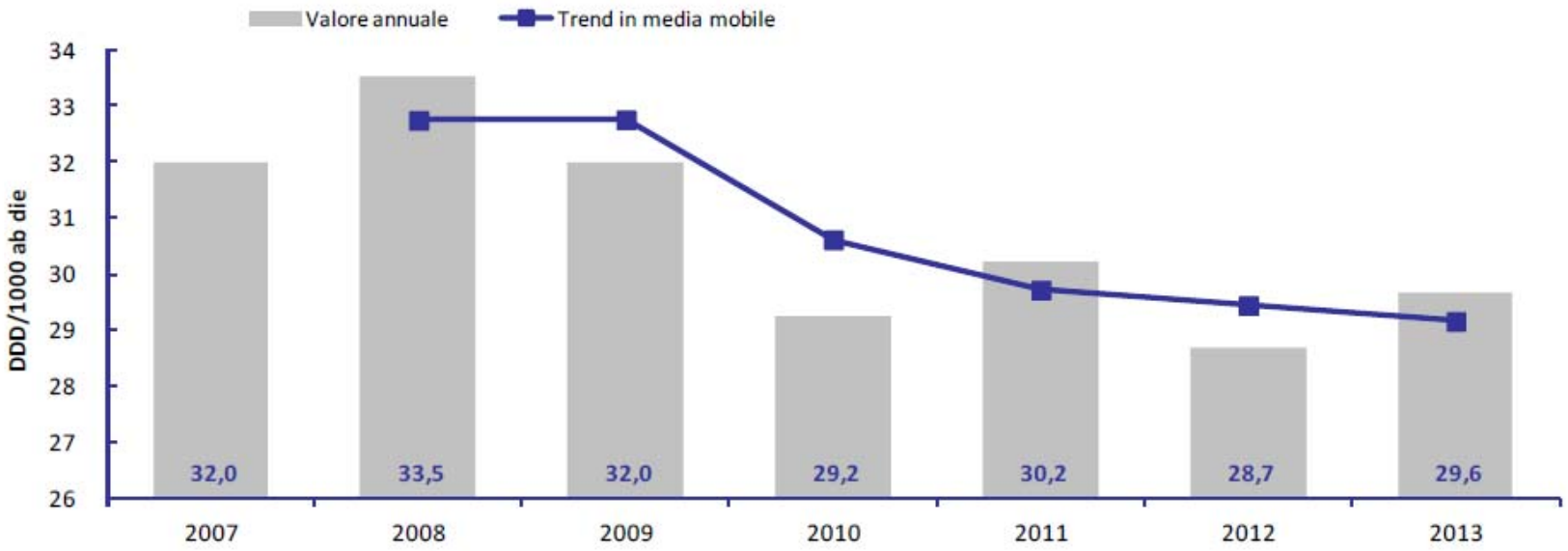
"Antibiotics? Only when necessary" - Web campaign

2014-2015



“With no rule antibiotics do not work"

Trend of systemic antibiotics use (DDD/1000)



Regional information campaigns

- ✓GPs/paediatricians active role (designing the campaign & using brochures/posters in their surgeries)
- ✓ advertisements on local media
- ✓newsletter on local antibiotic resistance (targeted at doctors and pharmacists)

BMJ

BMJ 2013;347:f5391 doi: 10.1136/bmj.f5391 (Published 12 September 2013) Page 1 of 10

RESEARCH

Feasibility and effectiveness of a low cost campaign on antibiotic prescribing in Italy: community level, controlled, non-randomised trial

OPEN ACCESS

Giulio Formoso *epidemiologist*, Barbara Paltrinieri *scientific journalist*, Anna Maria Marata *clinical pharmacologist*, Carlo Gagliotti *epidemiologist*, Angelo Pan *infectivologist*, Maria Luisa Moro *head of infective risk area*, Oreste Capelli *pneumologist*, Nicola Magrini *head of drug evaluation area*, for the LOCAAL Study Group

Emilia-Romagna Regional Agency for Health and Social Care, Viale Aldo Moro 21, 40127 Bologna, Italy

Table 1| **Change in antibiotic* consumption and expenditure in intervention and control areas and in rest of Italy, November 2011 to March 2012, compared with same period of previous year**

	Defined daily doses per 1000 inhabitants/day			€ per 1000 inhabitants/day		
Geographical area	Nov 2011–Mar 2012	Nov 2010–Mar 2011	% difference	Nov 2011–Mar 2012	Nov 2010–Mar 2011	% difference
Intervention provinces	20.0	22.7	−11.9	24.3	32.5	−25.1
Control provinces	21.0	22.7	−7.4	25.6	33.4	−21.8
Rest of Italy	26.1	27.0	−3.2	40.2	48.2	−16.7

€1.00 (£0.85; $1.32).

*Penicillins, cephalosporins, monobactams, macrolides, lincosamides, quinolones, and glycopeptides. See text for codes of Anatomical Therapeutic Chemical Classification System.

Emilia-Romagna 2014-2018 information campaigns

- ✓ Brochures/posters in GPs/paediatricians surgeries
- ✓ videos on videoterminals of waiting rooms (hospitals, clinics, outpatients)
- ✓ web posting
- ✓ videoterminals in railway stations
- ✓ **posters on hand hygiene in nursery and primary schools**

Campagna "Antibiotici. E' un peccato usarli male: efficaci se necessari, dannosi se ne abusi"

SURVEILLANCE AND RESEARCH

Surveillance for control of antimicrobial resistance

Tacconelli E et al. *Lancet Infect Dis 2*

*velina Tacconelli, Frangiscos Sifakis, Stephan Harbarth, Remco Schrijver, Maaike van Mourik, Andreas Voss, Mike Sharland, ithya Babu Rajendran, Jesús Rodríguez-Baño, on behalf of the EPI-Net COMBACTE-MAGNET Group**

	Surveillance system or institution
nal	
a	National Reference Center for Nosocomial Infections and Antimicrobial Resistance (NRZ)
m	The Scientific Institute of Public Health (WIV-ISSP)
ia	Bulgarian Surveillance Tracking Antimicrobial Resistance (BulSTAR)
a	Intersectoral Coordination Mechanism for the Control of Antimicrobial Resistance (ISKRA)
a	Croatian Institute of Public Health (CIPH)
s	National antimicrobial resistance surveillance system
Republic	National Institute of Public Health (NIPH)
ark	Danish Integrated Antimicrobial Resistance Monitoring and Research Programme (DANMAP)
d	Finnish Study Group for Antimicrobial Resistance (FIRE)
e	The National Observatory of the Epidemiology of Bacterial Resistance to Antibiotics (ONERBA)
any	Hospital surveillance system for nosocomial infections (KISS)
any	Antibiotic Resistance Surveillance (ARS)
any	Surveillance of antibiotic use and bacterial resistance in intensive care units (SARI)
any	Monitoring antibiotic resistance in Niedersachsen (ARMIN)
e	Greek System for the Surveillance of Antimicrobial Resistance (GSSAR)
ary	National Nosocomial Surveillance System (NNSR)
d	Health Protection Surveillance Centre (HPSC)
Italy	Regional surveillance system for intensive care units (SITIER)
Italy	National surveillance systems for post-surgical infections (SNICh)
Italy	Prospective surveillance of nosocomial infections in intensive care units (SPIN-UTI)
Italy	Surveillance of antibiotic resistance—National Institute of Health (AR-ISS)
Lithuania	Surveillance of antibiotic resistance—Institute of Vilnius
Netherlands	Infectious Disease Surveillance and Information System for Antibiotic Resistance (ISIS-AR)
Norway	Norwegian surveillance system: health-care-associated infections module for surgical site infections; antimicrobial drug resistance module; communicable diseases (FHI)
Portugal	Antibiotic Resistance Surveillance Programme in Portugal (ARSIP)
Romania	Sentinel surveillance system of nosocomial infections and antimicrobial resistance
Slovakia	Slovak National Antimicrobial Resistance Surveillance System (SNARS)
Spain	Estudio Nacional de Vigilancia de Infección Nososcomial en Servicios de Medicina Intensiva (ENVIN-UCI)
Sweden	Annual resistance monitoring and quality control programme (ResNet)
Sweden	Swedish surveillance of antimicrobial resistance (Svebar)
Switzerland	Swiss Centre for Antibiotic Resistance (ANRESIS)

(Table 1 continues in next column)

	Surveillance system or institution
(Continued from previous column)	
Switzerland	CA-MRSA surveillance system (CA-MRSA)
Regional	
Italy	Regional (Emilia-Romagna) surveillance of anti resistance and intravenous antibiotic usage (LA
Italy	Regional (Toscana) surveillance of antibiotic re (SART)
Spain	Regional surveillance system (Asturias; SVPCIP
Spain	Regional surveillance system (Galicia; SVIN)
Spain	Regional surveillance system (Catalunya; VINC
Spain	Prevention and control of nosocomial infectio inappropriate usage of antibiotics (PIRASOA)
Switzerland	Prevention and control of nosocomial infectio
UK	Welsh Healthcare Associated Infections Progra (WHAIP)
UK	Health Protection Scotland (HPS)
UK	Public Health England (PHE)
UK	Public Health Agency (PHA)

CA-MRSA=community-associated-meticillin resistant *Staphylococcus*

Table 1: **National and regional surveillance systems of antimi resistance**

Surveillance for control of antimicrobial resistance

*Evelina Tacconelli, Frangiscos Sifakis, Stephan Harbarth, Remco Schrijver, Maaike van Mourik, Andreas Voss, Mike Sharland, Nithya Babu Rajendran, Jesús Rodríguez-Baño, on behalf of the EPI-Net COMBACTE-MAGNET Group**

Panel: Limitations of antimicrobial resistance surveillance in Europe

Structural problems

- Differing objectives
- Insufficient coordination and sharing of information
- Inadequate standardisation of data collected and methods of microbiological testing (including susceptibility testing), and data sharing policies
- Delay in publication and insufficient publication for food surveillance data

Laboratory-based surveillance issues

- Insufficient associated and relevant epidemiological, clinical, and outcome data
- Genetic typing and characterisation not routinely included
- Biases introduced by sample collection protocols

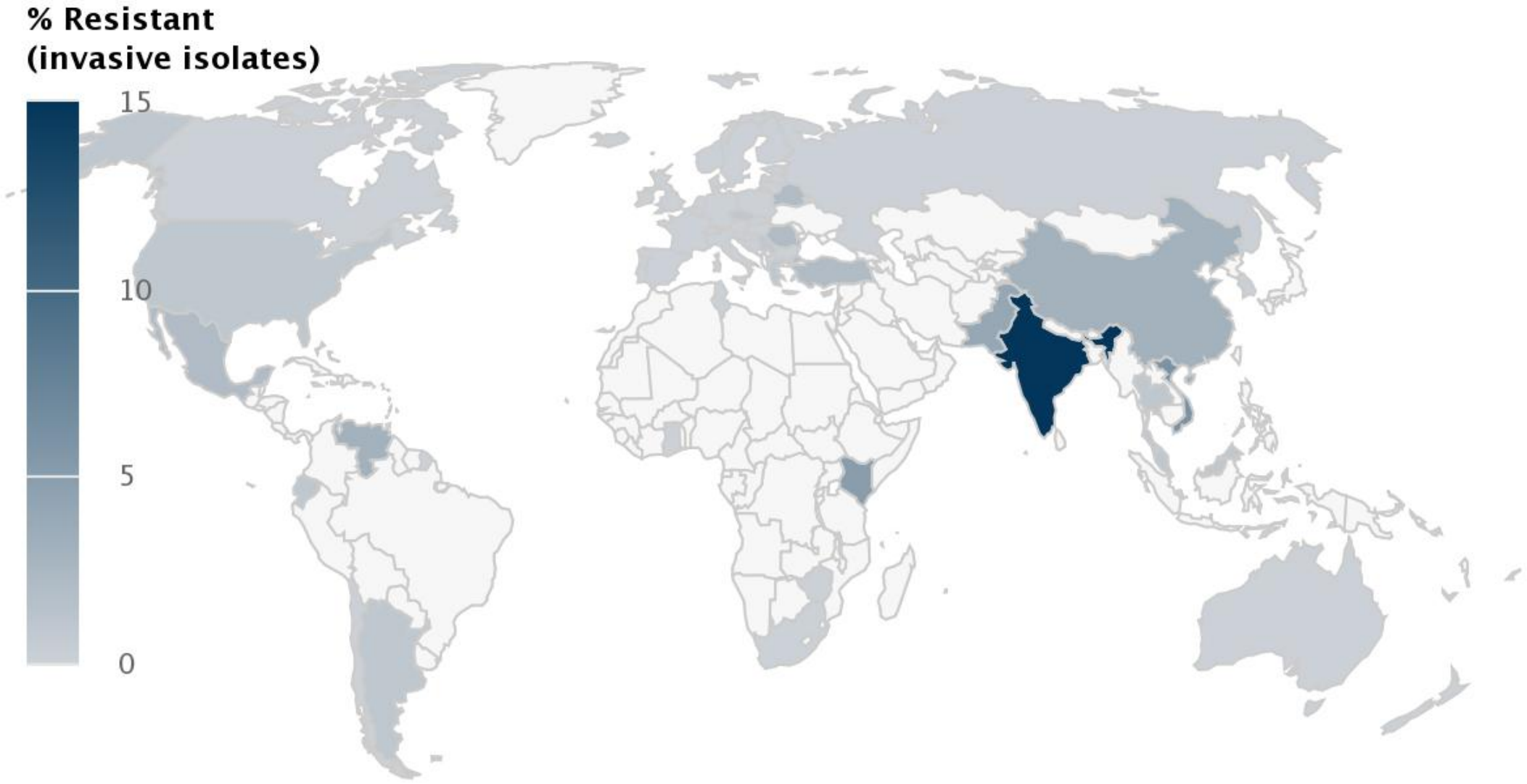
Insufficient coordination between human, animal, and food systems

- Data collection in animals directed at disease eradication and not detection of resistance to either animal or human drugs
- Coverage of only veterinary pathogens and antibiotics in animal and food surveillance systems

Tacconelli E et al.
Lancet Infect Dis
2017

Resistance of *Escherichia coli* to Carbapenems

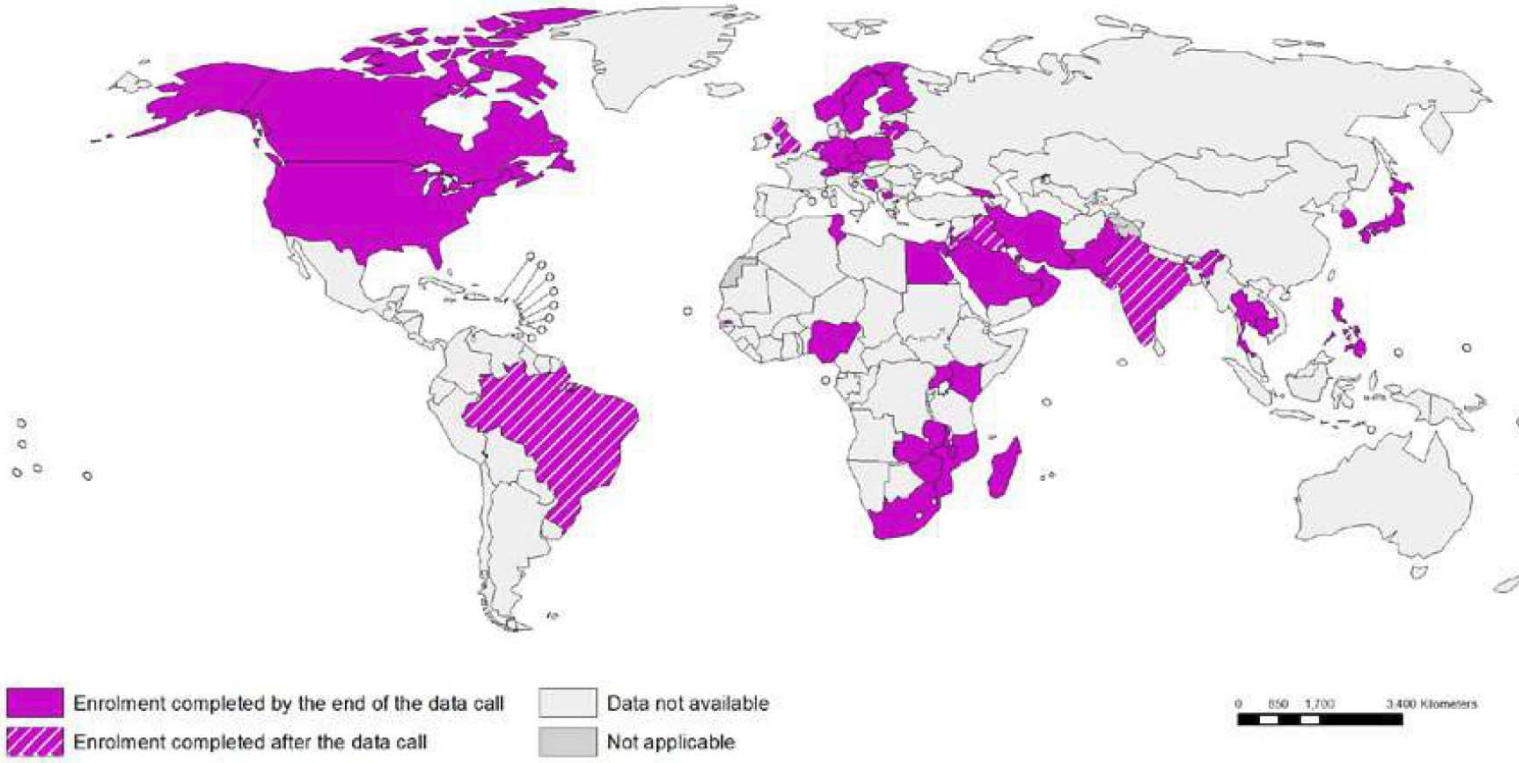
Condivisione delle informazi



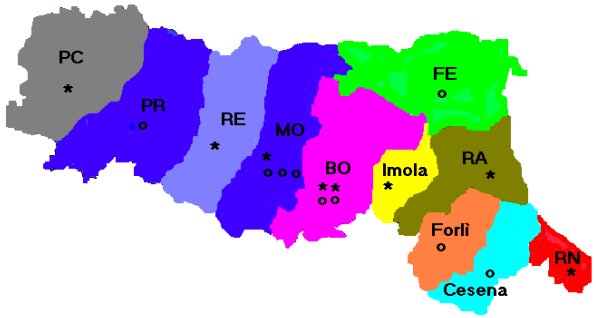
https://resistancemap.cddep.org/

Aumento progressivo dei paesi con un sistema di sorveglianz

Figure 2.1 GLASS Enrolment map (2017)



Sorveglianza: programmi regionali



Copertura (tutte le Aziende Sanitarie)

Disponibilità dei dati: tempestivi, open e condivisi

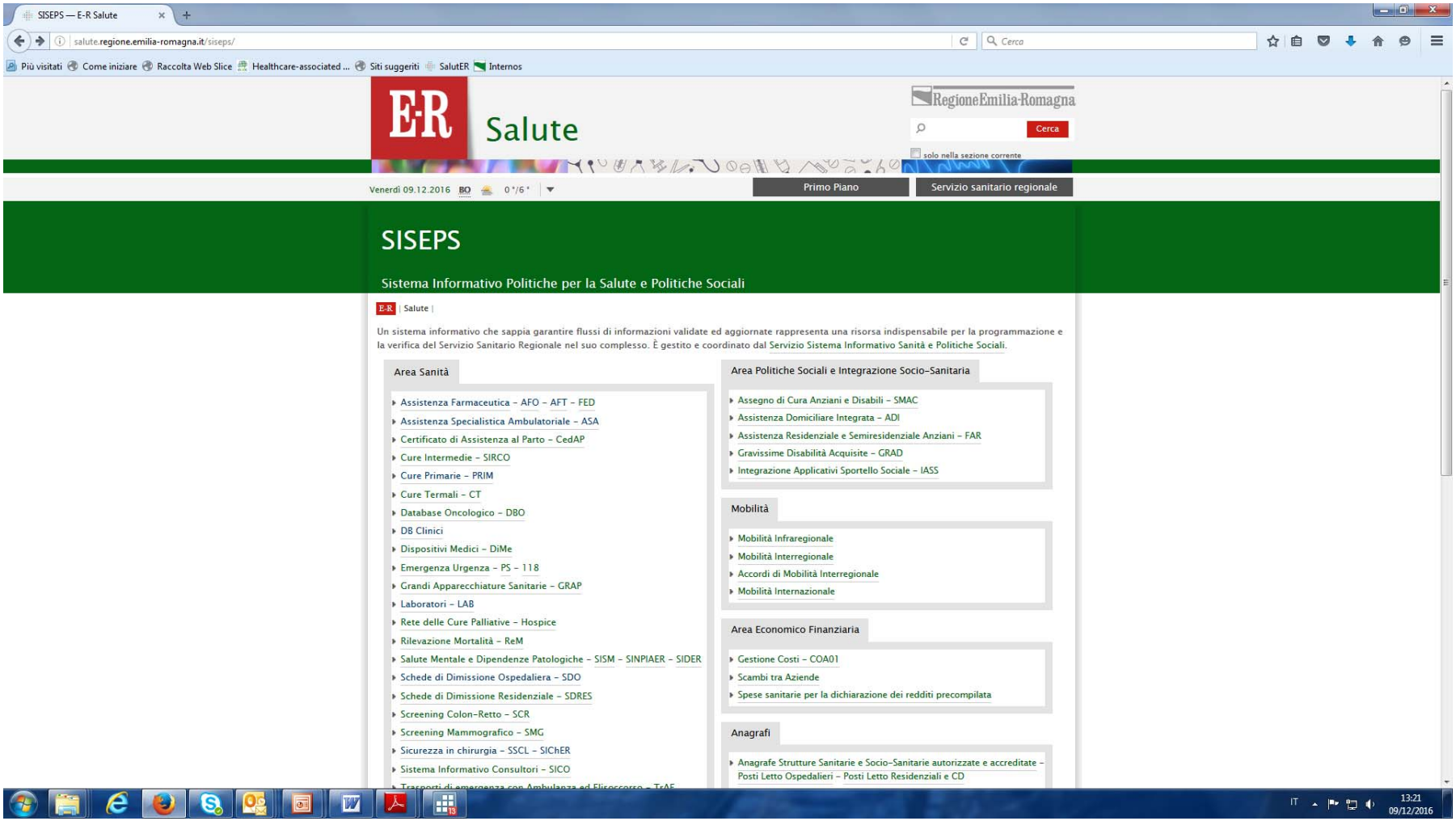
Tutte gli ambiti assistenziali (ospedale, strutture residenziali, comunità)

Dimensioni sorvegliate
(Resistenza antibiotica, utilizzo di antibiotici, infezioni correlate all'Assistenza)

Analisi integrata
(dati amministrativi)

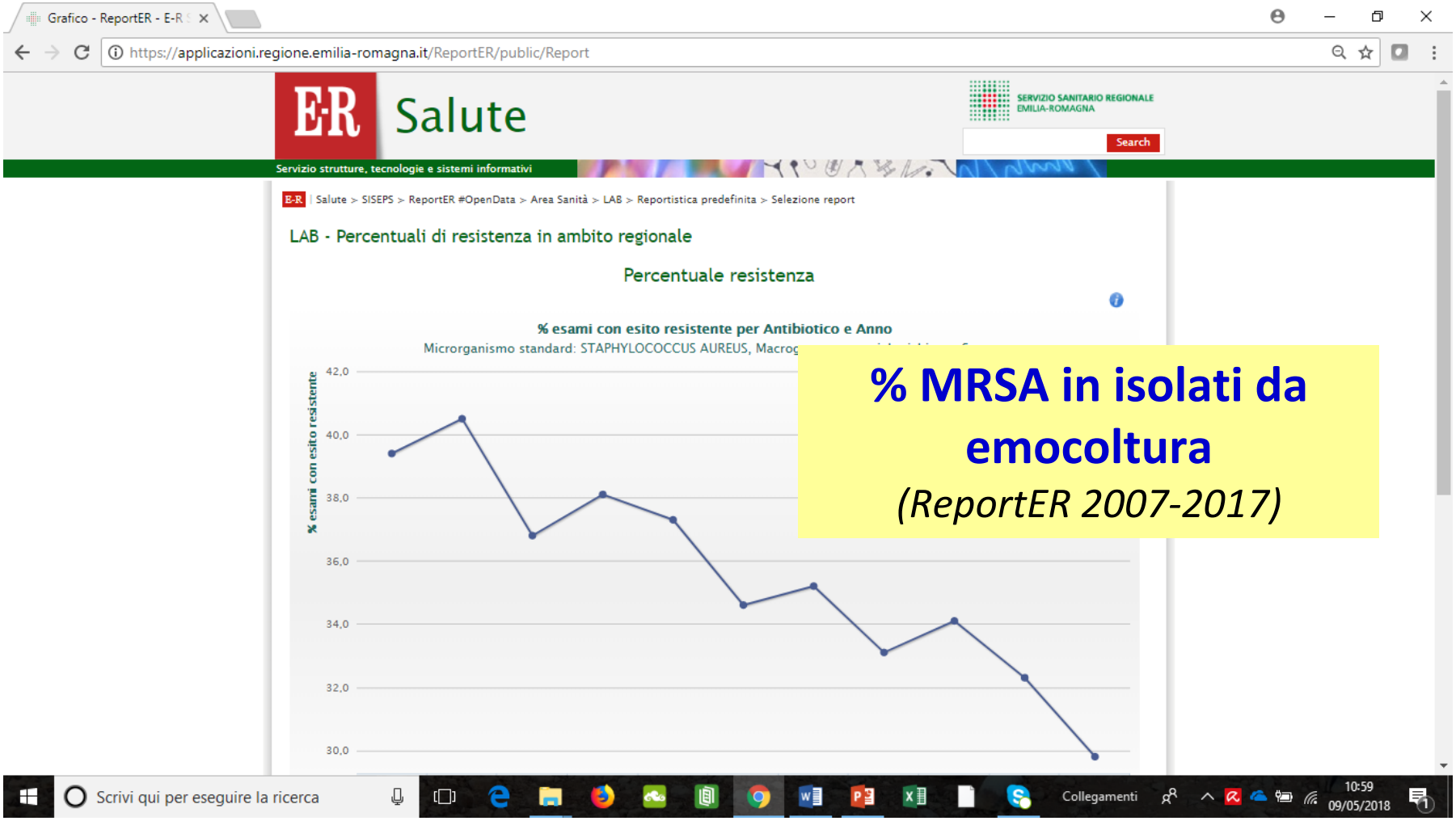
Sistema informativo politiche per la salute e politiche sociali (SISEPS)

Flussi per sorveglianza Infezioni, Resistenze e uso antibiotici

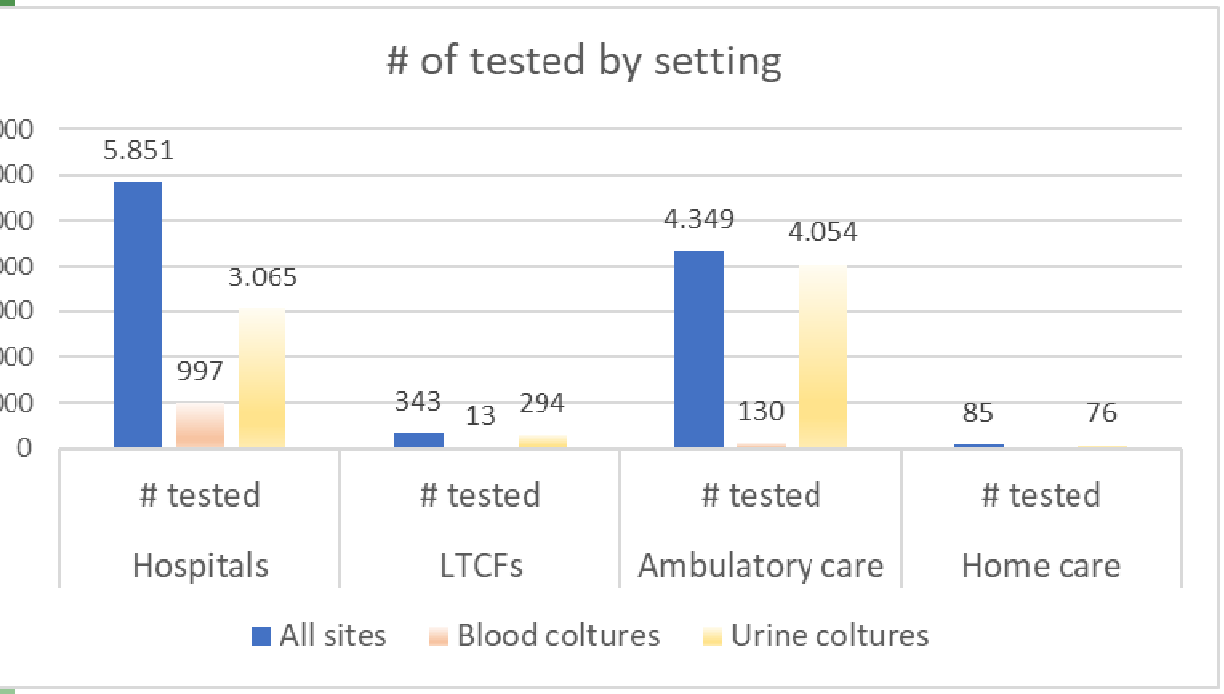


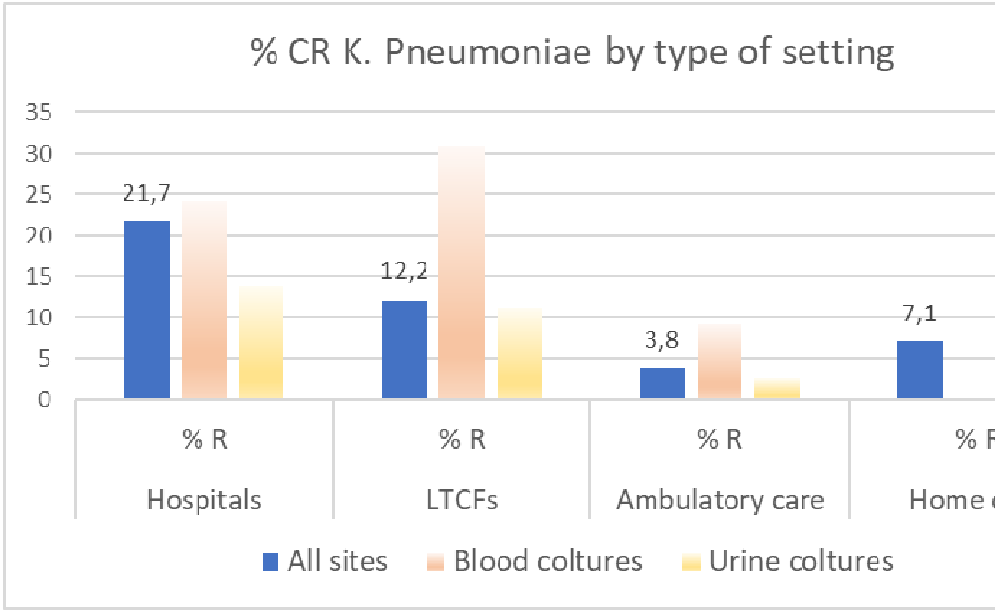
Sistema LAB

Sorveglianza antibioticoresistenza



Klebsiella pneumoniae resistente ai carbapenemi





Data availability: what is the antimicrobial resistance situation in the particular hospital or LTCF transferring patients to mine?

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA

SISEPS

Regione Emilia-Romagna

ntuali di resistenza - Percentuale resistenza nei pazienti ricoverati (dato per ospedale)
olati e percentuale per Presidio di ricovero, Microrganismo standard, Antibiotico e Esito qualitativo

no: 2015 (parziale), Microrganismo standard: ESCHERICHIA COLI, Azienda di ricovero:

Presidio di ricovero:

Microrganismo standard e Antibiotico		Resistente		Intermedio		Sensibile		TOTALE	
		Esami	%	Esami	%	Esami	%	Esami	%
ESCHERICHIA COLI	amikacina	1	2,6	4	10,3	34	87,2	39	100,0
	aminoglicosidi (esclusa amikacina)	6	15,0	.	.	34	85,0	40	100,0
	aminopenicilline	22	55,0	.	.	18	45,0	40	100,0
	amoxicillina-ac.clavulanico	15	37,5	.	.	25	62,5	40	100,0
	cefalosporine III gen.	6	15,0	1	2,5	33	82,5	40	100,0
	ertapenem	.	.	.	.	40	100,0	40	100,0
	fluorochinoloni	19	47,5	.	.	21	52,5	40	100,0
	fosfomicina	.	.	.	.	39	100,0	39	100,0
	imipenem/meropenem	.	.	.	.	40	100,0	40	100,0
	nitrofurantoina	.	.	.	.	39	100,0	39	100,0
	trimethoprim-sulfametossazolo	11	27,5	.	.	29	72,5	40	100,0

A specific hospital

ML Moro

LTCFs

Percentuali di resistenza - Percentuale resistenza
Primi isolati e percentuale per Azienda richiedente, Microrganismo standard, Antibiotico, Gruppo struttura rich qualitativo

Anno: 2017, Microrganismo standard: KLEBSIELLA PNEUMONIAE, Azienda richiedente

Microrganismo standard e Antibiotico		Struttura residenziale/semiresidenziale							
		Resistente		Intermedio		Sensibile		TOTALE	
		Esami	%	Esami	%	Esami	%	Esami	%
KLEBSIELLA PNEUMONIAE	amikacina	3	3,0	.	.	96	97,0	99	100,0
	aminoglicosidi (esclusa amikacina)	34	34,3	2	2,0	63	63,6	99	100,0
	amoxicillina-ac.clavulanico	46	46,9	.	.	52	53,1	98	100,0
	cefalosporine III gen.	49	49,5	0	0,0	50	50,5	99	100,0
	colistina	1	4,5	.	.	21	95,5	22	100,0
	ertapenem	17	50,0	0	0,0	17	50,0	34	100,0
	fluorochinoloni	55	55,6	3	3,0	41	41,4	99	100,0
	fosfomicina	19	22,4	.	.	66	77,6	85	100,0
	imipenem/meropenem	14	41,2	1	2,9	19	55,9	34	100,0
	piperacillina-tazobactam	2	66,7	.	.	1	33,3	3	100,0
	tigeciclina	.	.	.	.	.	.	.	.
	trimethoprim-sulfametossazolo	38	39,6	1	1,0	57	59,4	96	100,0

Emergence of ciprofloxacin resistance in *Escherichia coli* isolates from outpatient urine samples

C. Gagliotti, L. Nobilio and M. L. Moro, on behalf of the Emilia-Romagna Antibiotic Resistance Study Group

Clinical Microbiology and Infection, Volume 13 Number 3, March 2007

Data for the study were obtained from the antimicrobial resistance surveillance system of Emilia-Romagna, as well as databases concerning patterns of care in the resident population, home care and mortality

Table 1. Factors associated w emergence of ciprofloxacin ance among *Escherichia coli* i from the urine of outpatient variate and multivariate analy the case-control study)

	Cases (%)	Controls (%)	p values[a]	Adjusted ORs (95% CI)	p values[c]
Total n = 11 428	237	11 191			
Age category (years)			<0.001		<0.001
18–49	26 (11.0)	3921 (35.0)		1	
50–64	46 (19.4)	2058 (18.4)		3.0 (1.8–5.0)	
≥65	165 (69.6)	5212 (46.6)		4.0 (2.6–6.1)	
Gender			0.306		0.028
Male	25 (10.5)	1431 (12.8)		1	
Female	212 (89.5)	9760 (87.2)		1.6 (1.0–2.5)	
No. of relapses/re-infections			<0.001		<0.001
0	158 (66.7)	9471 (84.6)		1	
1	49 (20.7)	1226 (11.0)		2.7 (1.9–3.8)	
≥2	30 (12.7)	494 (4.4)		4.6 (2.8–7.3)	
Days of follow-up (mean)	195.7	329.8	<0.001[d]	0.996[b]	<0.001
Fluoroquinolones			<0.001		<0.001
Ciprofloxacin	116 (49.0)	1502 (13.4)		6.2 (4.4–8.7)	
Norfloxacin	33 (13.9)	574 (5.1)		4.5 (2.8–7.1)	
Levofloxacin	21 (8.9)	659 (5.9)		2.5 (1.5–4.2)	
Other fluoroquinolones	8 (3.4)	226 (2.0)		3.1 (1.5–6.8)	
Other quinolones	5 (2.1)	92 (0.8)	0.051[e]		
Fosfomycin	13 (5.5)	866 (7.7)	0.198		
Penicillins/β-lactamase inhibitors	39 (16.5)	1005 (9.0)	<0.001	1.8 (1.2–2.7)	0.003
Extended-spectrum penicillins	22 (9.3)	730 (6.5)	0.090		
Cephalosporins	24 (10.1)	588 (5.3)	0.001	1.7 (1.1–2.7)	0.038
Macrolides	12 (5.1)	571 (5.1)	0.978		
Nitrofurantoin	0 (0)	10 (0.1)	1[e]		
Trimethoprim–sulphamethoxazole	16 (6.8)	432 (3.9)	0.023		
Aminoglycosides	3 (1.3)	35 (0.3)	0.044[e]		
Tetracyclines	0 (0)	30 (0.3)	1[e]		
Other agents	3 (1.3)	49 (0.4)	0.093[e]		

[a]Chi-square test.
[b]OR for 1-day increase of follow-up.
[c]Likelihood ratio test.
[d]Student's t-test.
[e]Fisher's exact test.

INFECTION PREVENTION

WHO Guidelines on Core Components of Infection Prevention & Control Programmes at the National and Acute Health Care Facility Level

WHO 2016

What's new in these Guidelines?

Many of the principles of what constitute the central elements of IPC programmes remain the same as those presented in 2009. However, the following aspects are highlighted as new:

THE APPROACH

- Evidence-based: 3 systematic reviews
- Evidence selection based on quality
- Based on country experience and expert consensus

NEW RECOMMENDATIONS

See next page for summary recommendations/good practice statements

IMPLEMENTATION FOCUS

Commitment to supporting implementation in low-and-middle-income countries

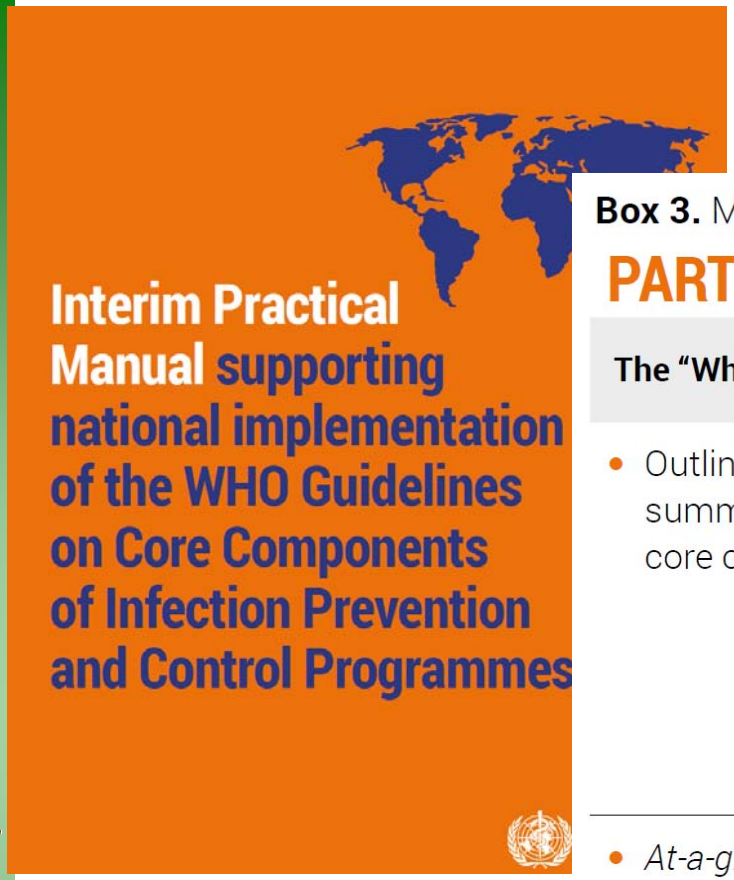
- Focus on multimodal behaviour change approaches and bundles
- Focus on WASH-IPC integration, environment & human factors
- Focus on AMR, IHR and IPC interface

World Health Organization

WHO Guidelines on Core Components of Infection Prevention & Control Programmes at the National and Acute Health Care Facility Level

WHO 2016

1	IPC programmes	R1a *Strong*; 1b *GPS*
2	Evidence-based guidelines	R2 *Strong*
3	Education & training	R3a *Strong*; 3b *GPS*
4	Surveillance	R4a *Strong*; R4b *Strong*
NEW 5	Multimodal Strategies	R5a *Strong*; R5b *Strong*
NEW 6	Monitoring, audit & feedback	R6a *Strong*; R6b *Strong*
NEW 7	Workload, staffing & bed occupancy	R7 *Strong*
NEW 8	Built environment, materials & equipment	8a *GPS*; R8b *Strong*



Box 3. Manual structure

PART I	PART II	PART III
The "What"	**The "How"**	**Supporting th "How": Tools**
• Outline and visual summary of the core component	• Stepwise approach to implementing each core component recommendation including case study examples	• Summary the key too and resour to support step of the implement process
• *At-a-glance summary of the guideline recommendations* • *Visual representation of the core component recommendations and how they relate to each other*	• *The **what, why, where, who, when** and **how** of each core component* • *Practical examples from a range of countries implementing the core components*	• *Checklists, to training, monitoring evaluation t advocacy a communica supporting culture cha tools, etc.*

World Health Organization

Instructions for the national infecti prevention and control assessment tool 2 (IPCAT2)

Updated July 2017

Supporting national implementation through effective baseline assessment

INFECTION PREVENTION AND CONTROL ASSESSMENT FRAMEWORK AT THE FACILITY LEVEL

Interpretation: A three-step process

1. Add up your points

	Score
Section (Core component)	**Subtotals**
1. IPC programme	
2. IPC guidelines	
3. IPC education and training	
4. HAI surveillance	
5. Multimodal strategies	
6. Monitoring/audits of IPC practices and feedback	
7. Workload, staffing and bed occupancy	
8. Built environment, materials and equipment for IPC at the facility level	
Final total score	

2. Determine the assigned "IPC level" in your facility using the total score from Step 1

Total score (range)	**IPC level**
0–200	Inadequate
201–400	Basic
401–600	Intermediate
601–800	Advanced

Infection prevention and control

Evidence, guidelines and publications

Setting standards through the development of WHO evidence-based recommendations and operating procedures, drives appropriate infection prevention and control (IPC) practices. Guidelines give direction on the effective application of IPC programmes, the safe use of invasive devices, the right infrastructure and resources to achieve good IPC standards, including actions such as hand hygiene at the point of care. Based on systematic reviews, as well as presenting practical country examples, expert consensus guidelines developed by WHO are inherently linked to focusing on implementation and mean that countries and health facilities can prioritise practical actions for improvement based on these reviews.

Hand hygiene

Hand hygiene

Injection safety

Injection safety

Focus on AMR

Focus on AMR

Surgical site infections

Surgical site infections

Core components for IPC

Core components for IPC

Other interventions

Other interventions

Regione Emilia-Romagna
SERVIZIO SANITARIO REGIONALE EMILIA-ROMAGNA

Agenzia sanitaria e sociale regionale

Prevenzione delle infezioni del sito chirurgico

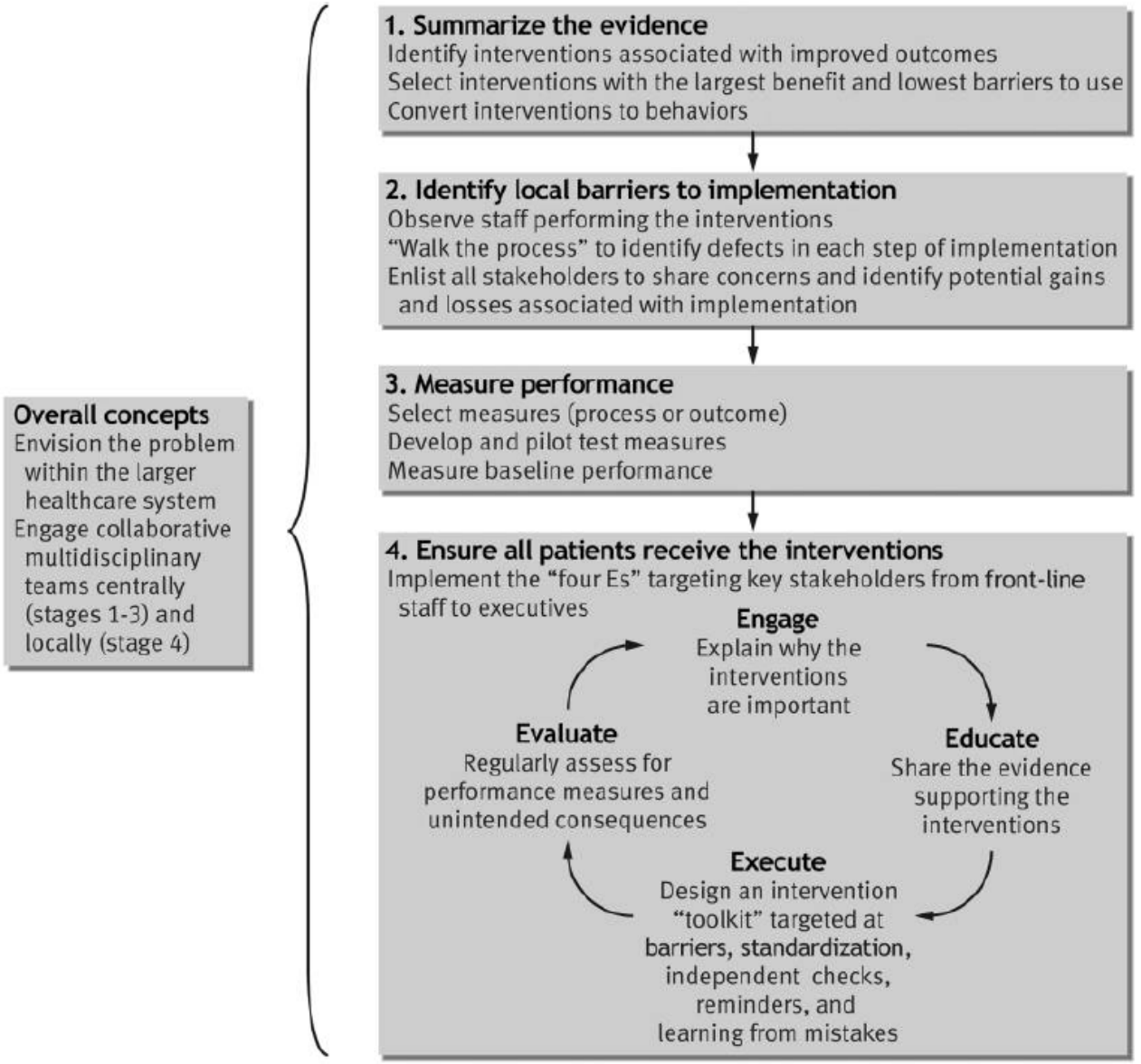
DOSSIER 261-2017
ISSN 1591-223X

- Non praticare di norma la tricotomia nel pre-operatorio (CDC 1999, IA; SFHH 2004 NICE 2008, 1+; SHEA 2008, AI; WHO 2016, forte/moderata).
- Eseguire la tricotomia solo se assolutamente indispensabile (se i peli, in corrispond o attorno al sito chirurgico, interferiscono con l'intervento) (CDC 1999, IA; SFHH 2 B1; NICE 2008, 1+; SHEA 2008 AI; WHO 2016, forte/moderata).
- Se si effettua la tricotomia, praticarla il giorno dell'intervento, solo con clipper ele (CDC 1999, IA; SFHH 2004, B1; NICE 2008, 1+; SHEA 2008, AI; WHO 2 forte/moderata; ACS-SIS 2016) o con una forbice (WHO 2016, forte/moderata).
- Eseguire la tricotomia in reparto alla chiamata o in pre-sala.
- La tricotomia con rasoio con lame tradizionali è assolutamente sconsigliata (SFHH 2 E1; NICE 2008, 1+) sia nella fase pre-operatoria sia in sala operatoria (WHO 2 forte/moderata).
- Non è possibile raccomandare o meno l'uso delle creme depilatorie in quant indicazioni sono controverse.

Implementation Science: How to Jump-Start Infection Prevention

Sanjay Saint, MD, MPH; Joel D. Howell, MD, P

ICHE 2010, vol. 31, no. s1



ical Infectious Diseases
NVITED ARTICLE
LTHCARE EPIDEMIOLOGY: Robert A. Weinstein, Section Editor

nplementing Antimicrobial Stewardship in Long-term are Settings: An Integrative Review Using a Human ctors Approach

an J. Katz,[1] Ayse P. Gurses,[2] Pranita D. Tamma,[3] Sara E. Cosgrove,[1] Melissa A. Miller,[4] and Robin L. P. Jump[5,6]

ment of Medicine, Division of Infectic
c Health, Whiting School of Engineeri
thcare-Associated Infections, Center f
nical Center, Louis Stokes Cleveland V
nd, Ohio

Effectiveness of national and subnational infection prevention and control interventions in high-income and upper-middle-income countries: a systematic review

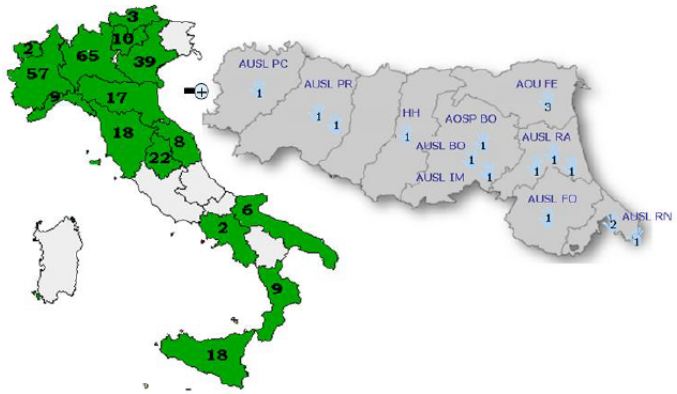
Lesley Price, Jennifer MacDonald, Lynn Melone, Tracey Howe, Paul Flowers, Kay Currie, Evonne Curran, Valerie Ness, Debbie Waddell, Sarkis Manoukian, Agi McFarland, Claire Kilpatrick, Julie Storr, Anthony Twyman, Benedetta Allegranzi, Jacqui Reilly**

A multimodal infection control and patient safety intervention to reduce surgical site infections in Africa: a multicentre, before–after, cohort study

Benedetta Allegranzi, Alexander M Aiken, Nejla Zeynep Kubilay, Peter Nthumba, Jack Barasa, Gabriel Okumu, Robert Mugarura, Alexander Elobu, Josephat Jombwe, Mayaba Maimbo, Joseph Musowoya, Angèle Gayet-Ageron, Sean M Berenholtz

Campagna regionale Cure pulite

Campagna nazionale "Cure pulite sono cure più sicure" - Unita operative partecipanti



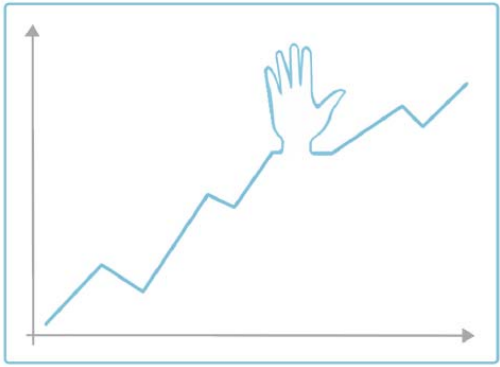
AUSL PC: Azienda USL Piacenza
HH: Hesperia Hospital Modena
AOSP BO: Azienda ospedaliero-universitaria Bologna
AOSP FE: Azienda ospedaliero-universitaria Ferrara
AUSL FO: ex Azienda USL Forlì

AUSL PR: Azienda USL Parma
AUSL BO: Azienda USL Bologna
AUSL IM: Azienda USL Imola
AUSL RA: ex Azienda USL Ravenna
AUSL RN: ex Azienda USL Rimini

Le Iniziative regionali per la Giornata Mondiale sull'Igiene delle Mani (5 Maggio 2007-2015

Materiali per le scuole materne e primarie

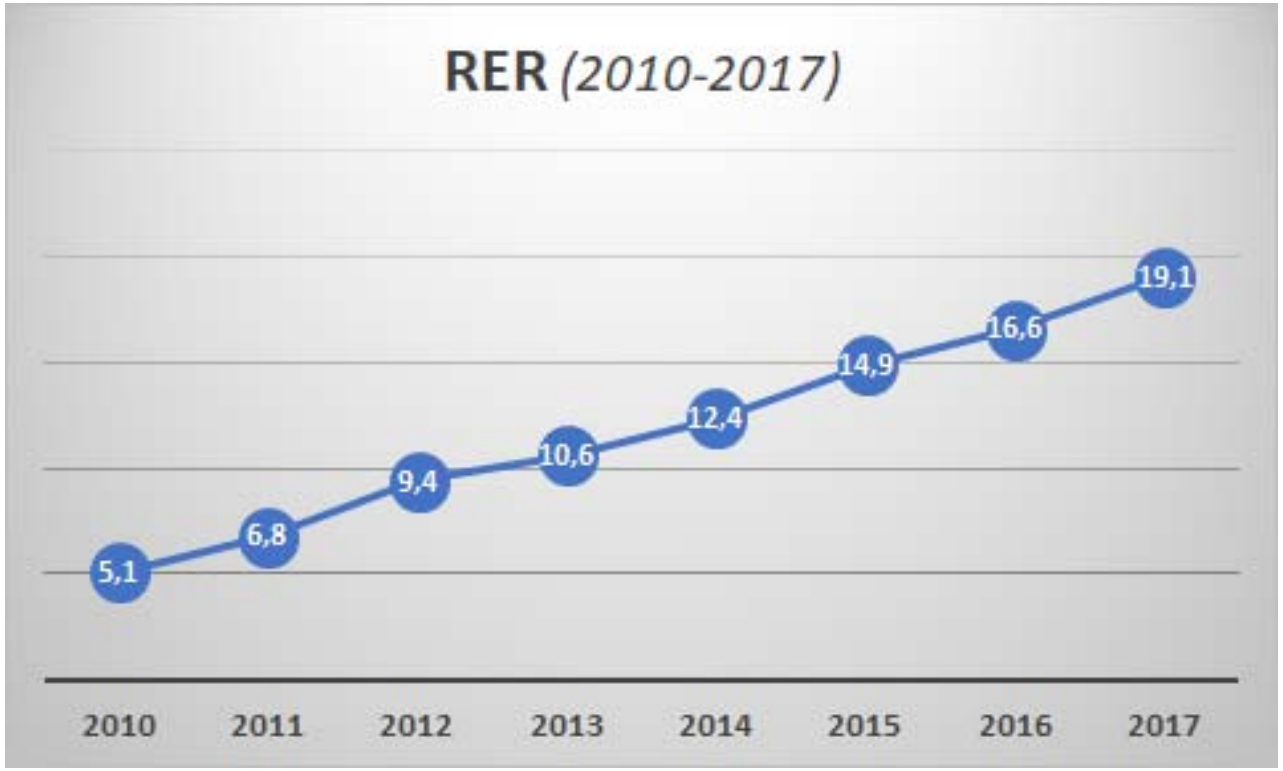
Progetto **RImani**
"Ricorda l'igiene d
mani"



MAppER
Mani App Emilia-Romagna

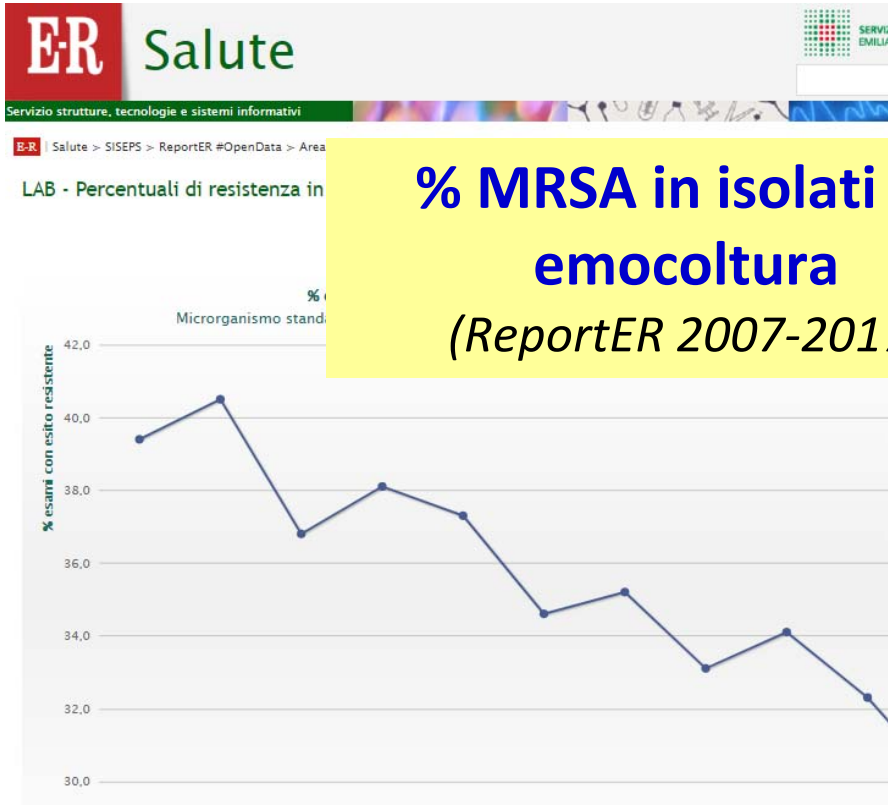
Monitoraggio annua dei consumi di prodo idroalcolici

Igiene delle mani



Uso prodotti idroalcolici RER

(litri/1000 gg deg.)



% MRSA in isolati emocoltura

(ReportER 2007-201

Dal 2011

Programma di intervento regionale per il controllo CPE

Raccomandazioni

Reportistica

Azienda Sanitaria _____ Azienda _____

Mese ___Ottobre___ Anno ___2011___

	N. di pazienti con batteriemia[§]	N. di pazienti con isolamento da altri campioni clinici[◊], non da sangue[◊]	N. di pazienti colonizzati identificati tramite attività di screening, nessun isolamento da campioni clinici[^]
Klebsiella pneumoniae			
Totale strutture ospedaliere pubbliche[§§]			
Ospedale			
Totale Case di cura e Ospedali privati per acuti			
Totale Strutture Residenziali socio-sanitarie e altri contesti assistenziali territoriali			
Escherichia coli			
Totale strutture ospedaliere pubbliche[§§]			
Ospedale			
Totale Case di cura e Ospedali privati per acuti			
Totale Strutture Residenziali socio-sanitarie e altri contesti assistenziali territoriali			
Altri enterobatteri			
Totale strutture ospedaliere pubbliche[§§]			
Ospedale			
Totale Case di cura e Ospedali privati per acuti			
Totale Strutture Residenziali socio-sanitarie e altri contesti assistenziali territoriali			

§ Segnalare i pazienti che hanno avuto almeno un isolamento di enterobatteri produttori di carbapenemasi e/o RI ai carbapenemi (ertapenem, imipenem o meropenem

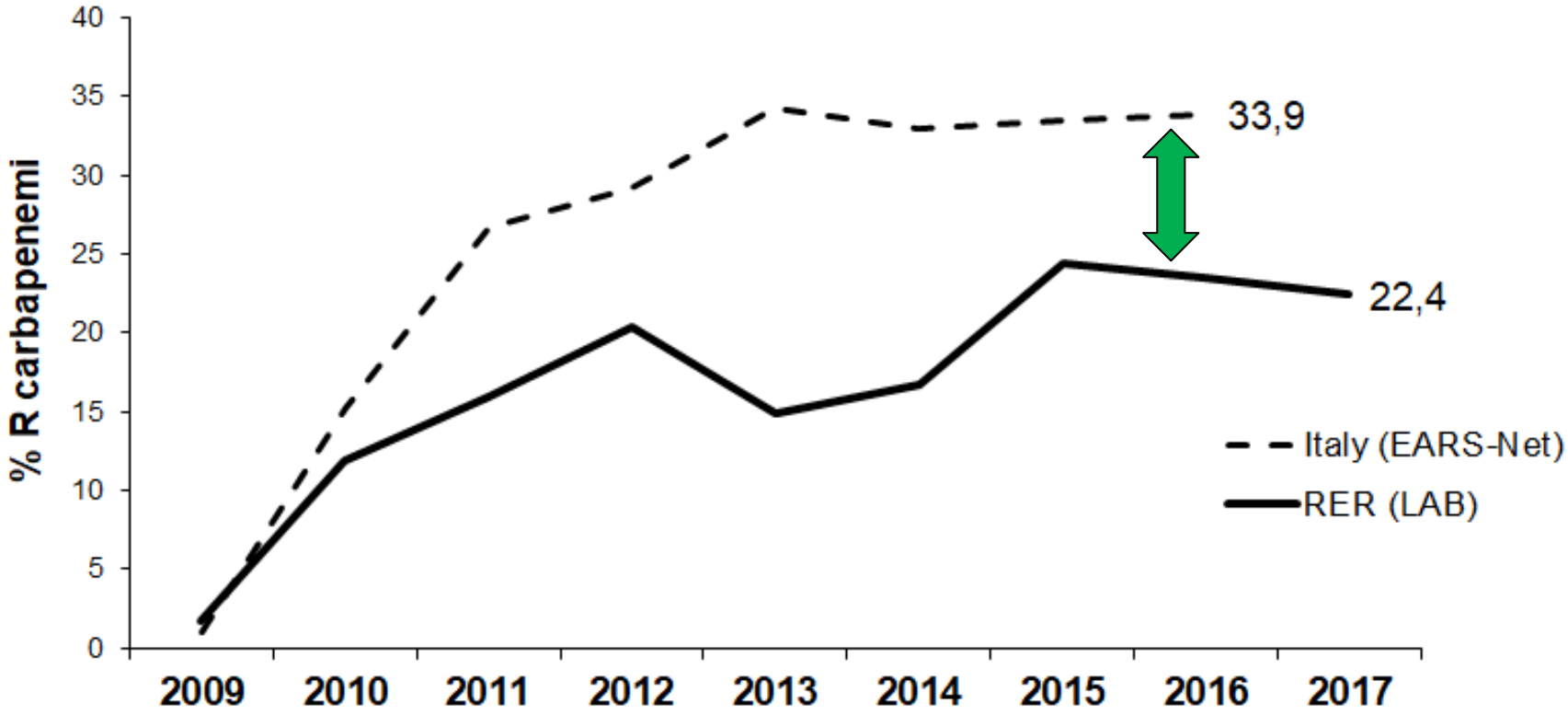
◊ I pazienti che hanno avuto nel mese isolamenti sia da sangue che da altri campioni clinici devono essere conteggiati solo nella colonna delle batteriemie

^ I pazienti che hanno avuto nel mese anche almeno un isolamento da campione clinico devono essere conteggiati solo in una delle due colonne precedenti

§§ Indicare i pazienti per stabilimento (il totale verrà calcolato automaticamente)

Klebsiella pneumoniae *(%R carbapenemi)*

*Emilia-Romagna **vs** Dato nazionale EARS-Net*



Isolati da emocolture

OPTIMIZE THE USE OF ANTIBIOTICS IN HUMAN AND VETERINARY MEDICINE

Effect of antibiotic stewardship on the incidence of infection and colonisation with antibiotic-resistant bacteria and *Clostridium difficile* infection: a systematic review and meta-analysis

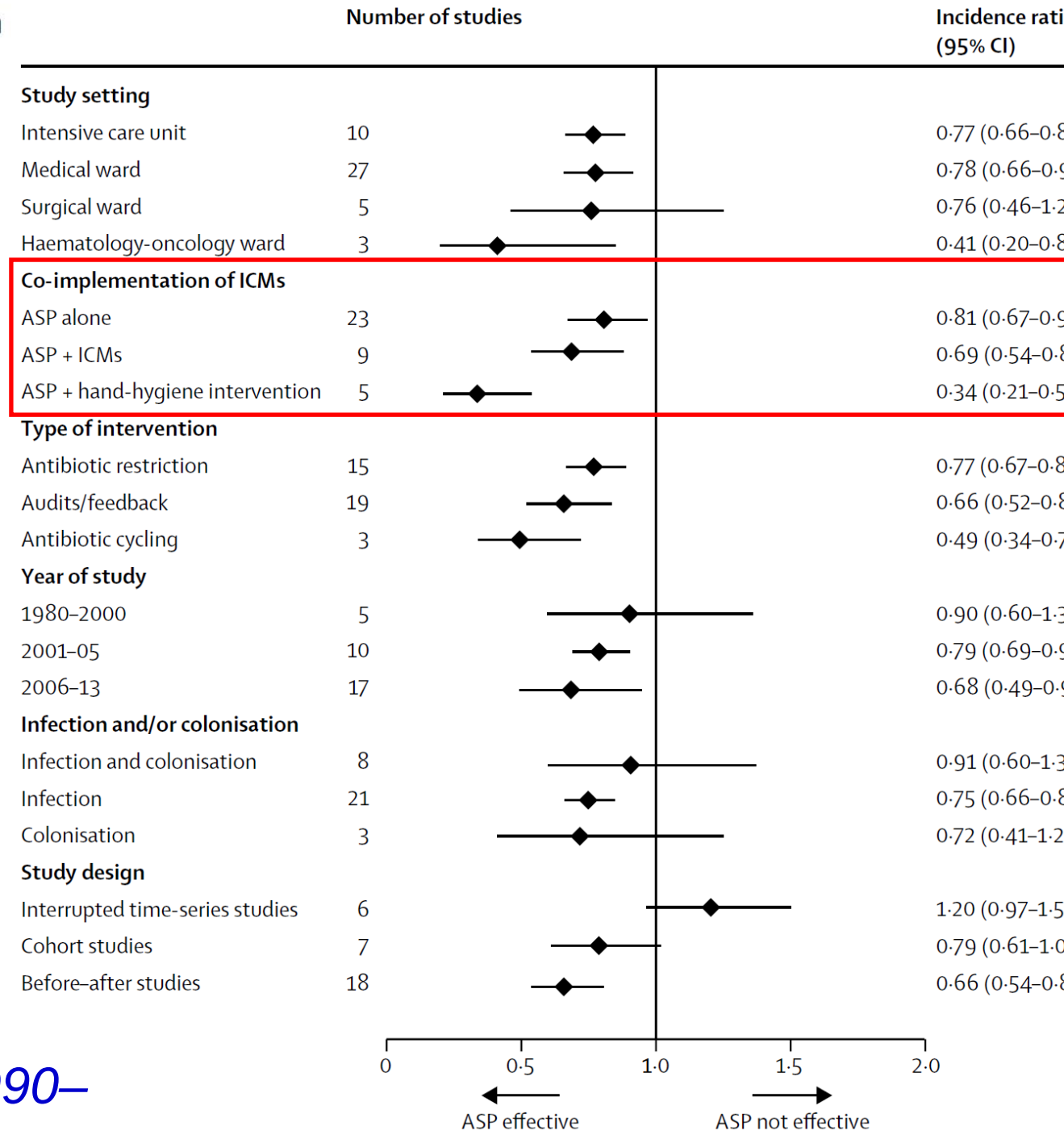
David Baur*, Beryl Primrose Gladstone*, Francesco Burkert, Elena Carrara, Federico Foschi, Stefanie Döbele, Evelina Tacconelli

Lancet Infect Dis 2017; 17: 990-1001

- ✓ **Reduction of the incidence of infections and colonisation** with:
  - multidrug-resistant Gram-negative bacteria (51% reduction; IR 0·49, 95% C 0·35–0·68; p<0·0001),
  - extended-spectrum β-lactamase-producing Gram-negative bacteria (48% 0·52, 0·27–0·98; p=0·0428),
  - meticillin-resistant *Staphylococcus aureus* (37%; 0·63, 0·45–0·88; p=0·0065),
  - *C difficile* infections (32%; 0·68, 0·53–0·88; p=0·0029).
- ✓ **More effective when implemented with infection control measures** (IR 0·69 0·54–0·88; p=0·0030), especially hand-hygiene interventions (0·34, 0·21–0·54 p<0·0001).

antibiotic stewardship on the incidence of infection nisation with antibiotic-resistant bacteria and *um difficile* infection: a systematic review and alysis

rimrose Gladstone*, Francesco Burkert, Elena Carrara, Federico Foschi, Stefanie Döbele, Evelina Tacconelli



Lancet Infect Dis 2017; 17: 990–1001

Table 3 Successful examples of antimicrobial stewardship in animal health

Country	Main measures implemented	Observed effects
Australia	Fluoroquinolones (FQ) not approved for livestock use	Levels of FQ resistance among *Escherichia coli* in humans are among the lowest regis FQ resistance in *Escherichia coli* is absent in food animals and foods. There are no FQ resistant strains of *Campylobacter spp.* or *Salmonella* spp. seen in food animals or domestic foods [90]. FQ resistance is absent or only at very low levels in domestically acquired *Campylobacter* or *Salmonella* infections in people.
Canada	Voluntary withdrawal of ceftiofur in ovo use.	Thirty months later, resistance levels cut by half in *Salmonella enterica* from chicken meat and humans and in retail chicken *Escherichia coli* [91].
Denmark	Ceasing antibiotic growth promotion in weaning pigs	Ten years after, the average daily weight put on by each animal was 20 % higher than before the ban, demonstrating that weight gains in livestock are achievable by other means than antibiotics [88].
Netherlands	Usage of fluoroquinolones and third and fourth generation cephalosporins reduced to a minimum	Antimicrobial consumption in animals fell 56 % from 2007 to 2012 [92].

Harbarth et al. Antimicrobial Resistance and Infection Control (2015) 4:49

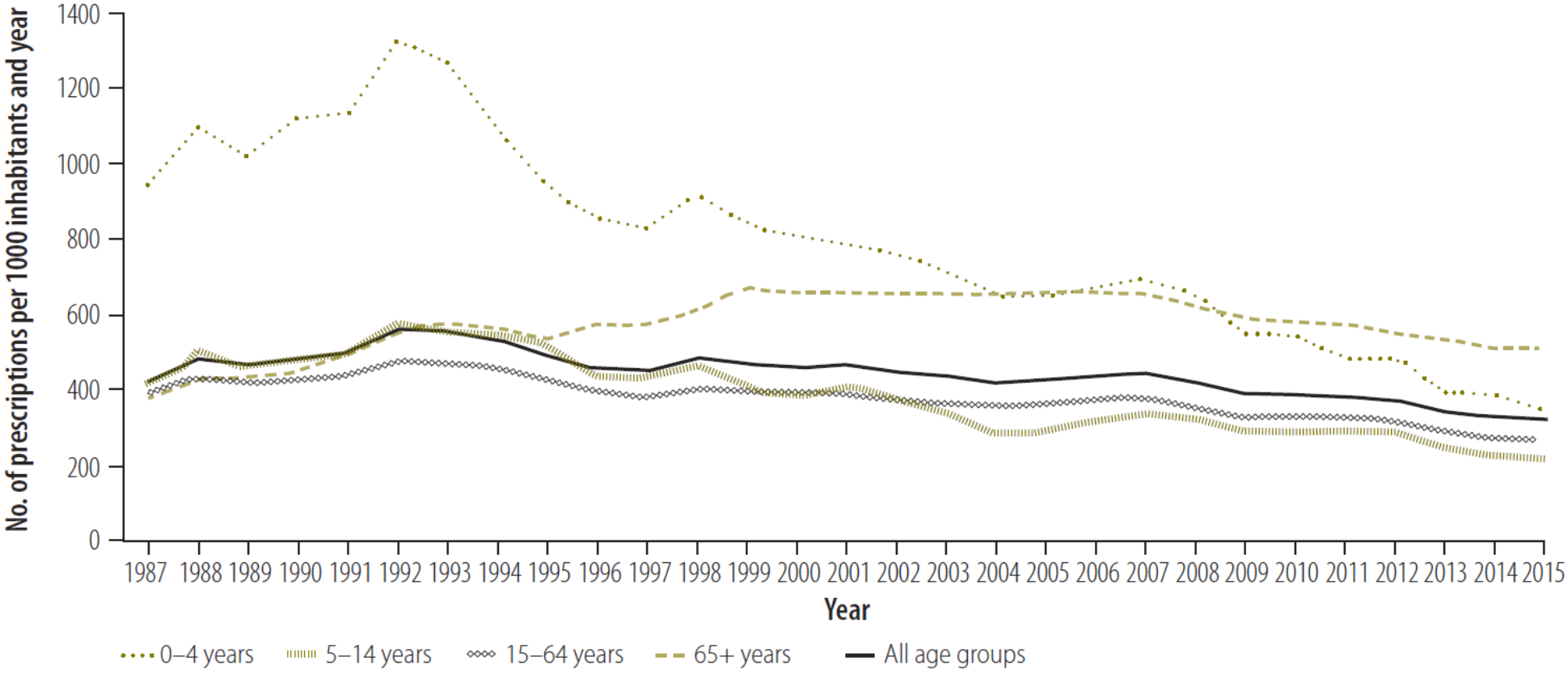
Bulletin WHO 201

Lessons learnt during 20 years of the Swedish strategic programme against antibiotic resistance

Sigvard Mölstad,[a] Sonja Löfmark,[b] Karin Carlin,[b] Mats Erntell,[c] Olov Aspevall,[b] Lars Blad,[d] Håkan Hanberger,[e] Katarina Hedin,[f] Jenny Hellman,[b] Christer Norman,[b] Gunilla Skoog,[b] Cecilia Stålsby-Lundborg,[g] Karin Tegmark Wisell,[h] Christina Åhrén[i] & Otto Cars[b]

- **committed work** at the local and national levels;
- **monitoring** of antibiotic use for informed decision-making;
- **a national target** for antibiotic prescriptions;
- **surveillance** of antibiotic resistance for local, national and global action; tracking resistance trends;
- **infection control** to limit spread of resistance;
- **Communication** to raise awareness for action and behavioural change.
- **A key element has been the bottom-up approach, including working closely with prescribers at the local**

Fig. 1. **Sales of antibiotics for systemic use in outpatient care, Sweden, 1987–2015**



Molstad S, Bulletin WHO 2017

Programma ProBA Bambini e antibiotici

Raccomandazioni EBM condivise

(PLS, ORL, genitori)

Linee guida ProBA – 2015

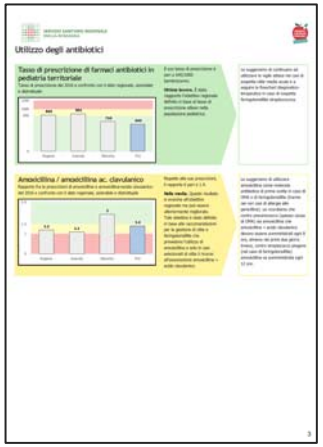
Implementazione, comunicazione, monitoraggio,

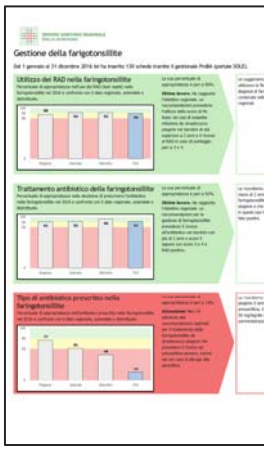
- Coinvolgimento PLS
- Formazione
- Accordi istituzionali con PLS
- Strumenti per diagnosi rapida
- Monitoraggio dell'utilizzo dei test rapidi (Cartella Sole)

Campagna regionale di comunicazione

- Reportistica predefinita in Report *(accesso libero)*

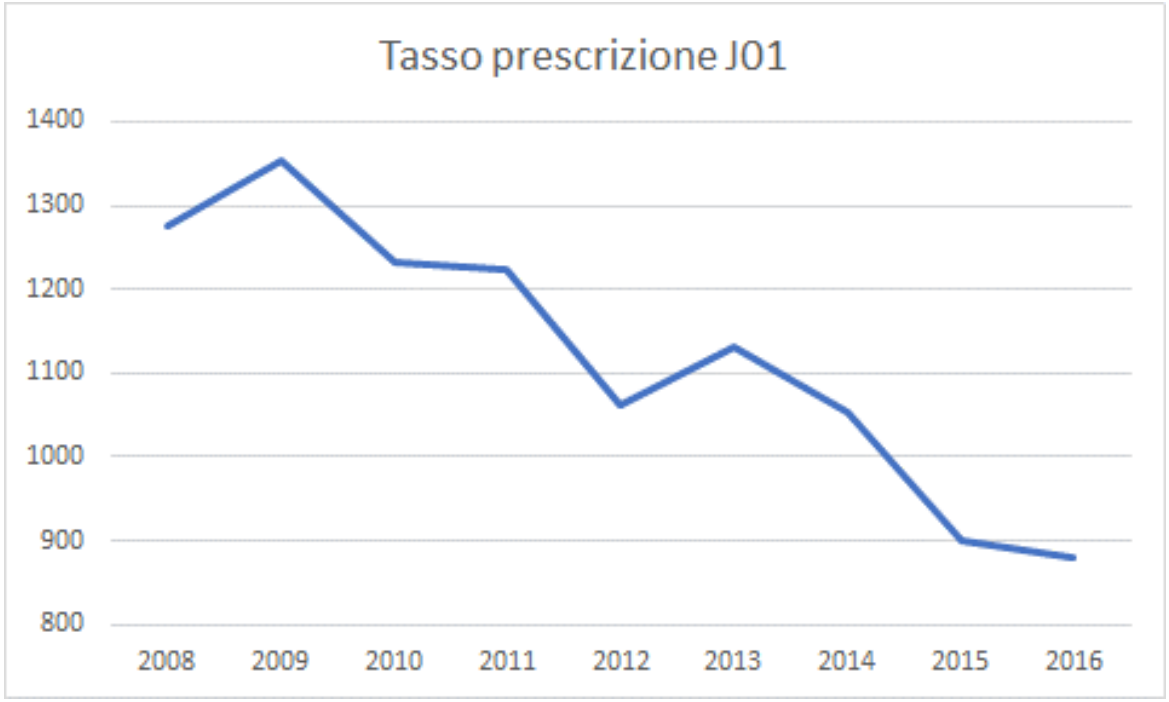
Rapporti personalizzati per PLS *(accesso con pass-word)*



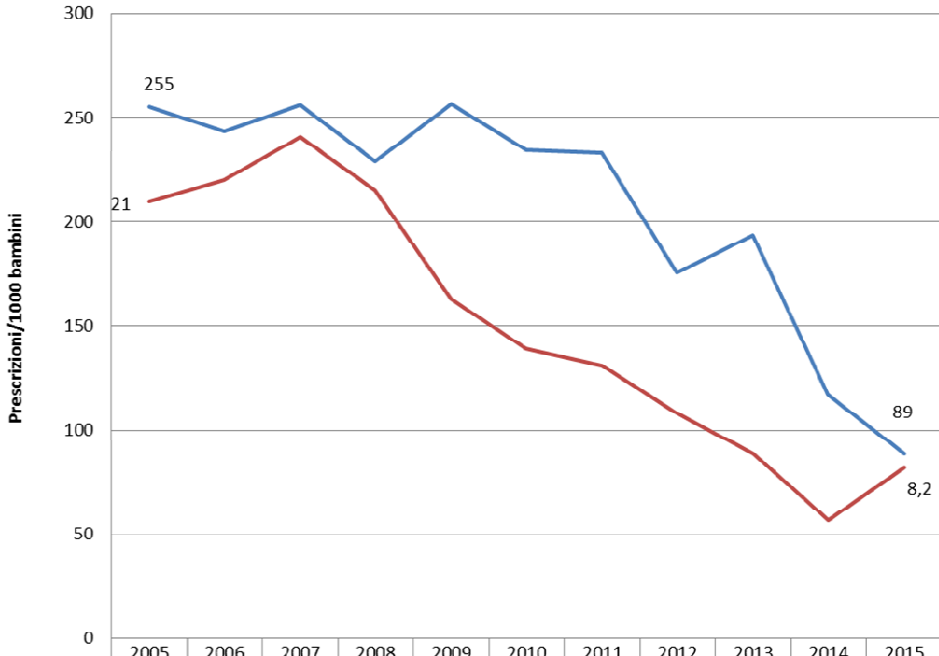


Impatto del Programma Proba

Prescrizioni di antibiotici nei bambini



Streptococco piogene resistente ai macrolidi nei bambini



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
N° macrolidi/1000 bambini	255	243	256	229	256	235	233	176	193	117	89
St. pyo. Fritro IR%	21	22	24,1	21,5	16,3	13,9	13,1	10,8	8,9	5,7	8,2

Global governance of antimicrobial resistance

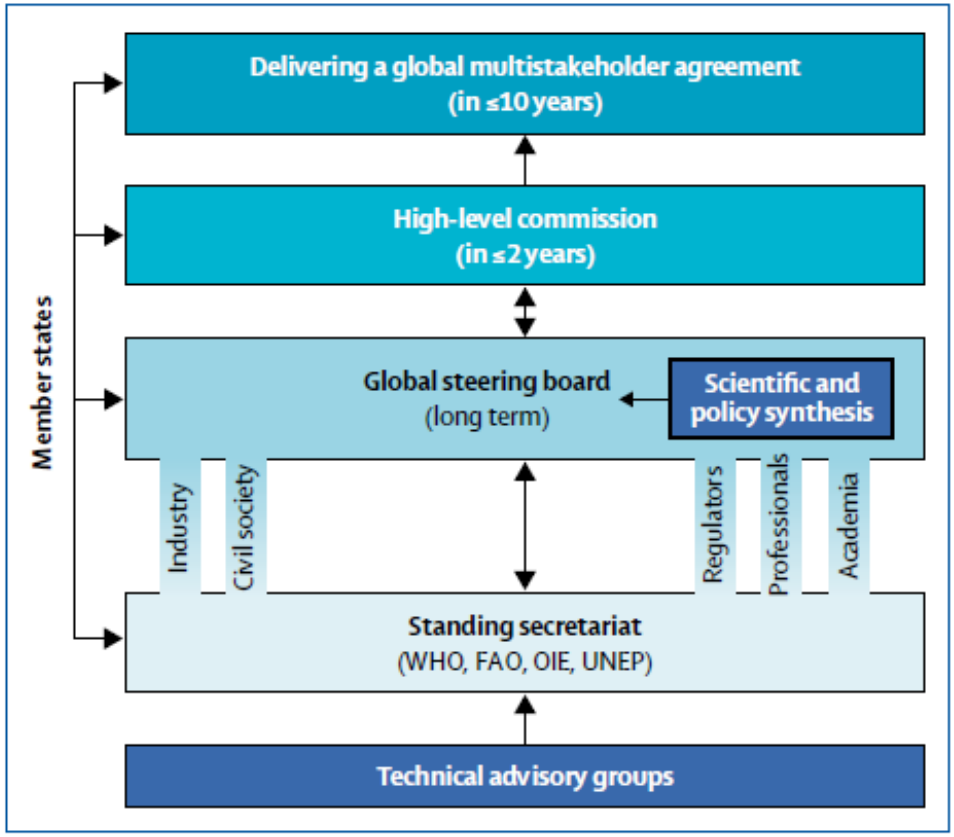
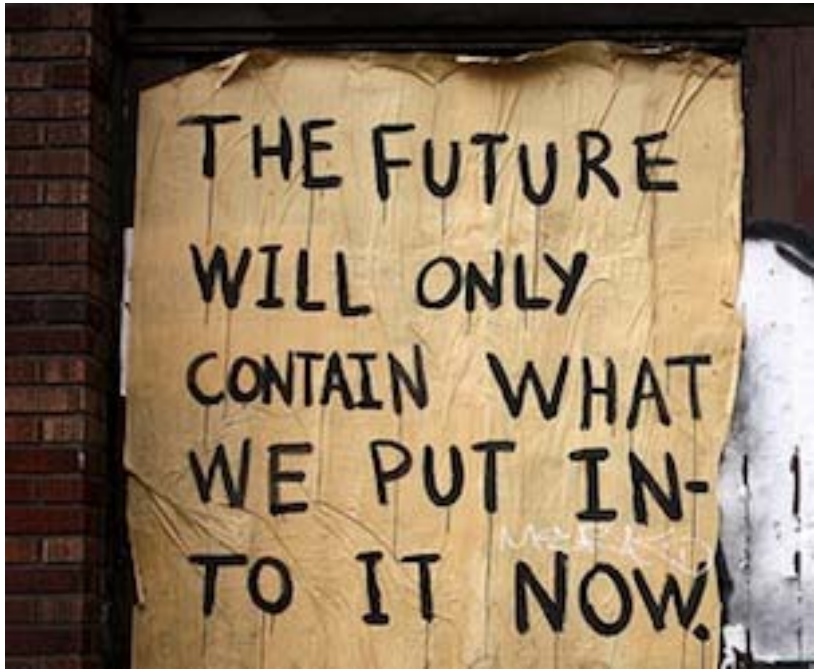


Figure: **Global governance for antimicrobial resistance proposal**
FAO=Food and Agriculture Organization of the United Nations; OIE=World Organisation for Animal Health; UNEP=UN Environment Programme.

- ✓ First, an effective mandate to encourage countr to make **binding national commitments**
- ✓ Second, a process for **reporting on these commitments**
- ✓ Third, the capacity, ability, and authority to **advocate for AMR**
- ✓ Fourth, the ability to **mobilise all stakeholders** including the private sector, civil society, and philanthropic actors.

Rochford C et al. Lancet 2018, May 19

Thank you


THE FUTURE
WILL ONLY
CONTAIN WHAT
WE PUT IN-
TO IT NOW.


SUINI ALLEVATI
SENZA ANTIBIOTICI
NEGLI ULTIMI 4 MESI.
UN IMPEGNO CHE NON È SOLO SULLA CARTA.
Coop lavora ogni giorno per migliorare le condizioni di allevamento degli
eliminare o ridurre l'uso degli antibiotici. Così si può contrastare l'aumento
resistenti e dare alle persone una garanzia in più per la loro salute. Per questo
animale è nell'interesse di tutti. Scopri di più su e-coop.it/alleviamolas
LA coop SEI TU.