



Trends in antimicrobial resistance in Europe

Dominique L. Monnet, on behalf of the Antimicrobial Resistance and Healthcare-Associated Infections (ARHAI) Disease Programme
IMED 2016, Vienna, 6 November 2016

ECDC – European Centre for Disease Prevention and Control



- An agency of the European Union, located in Stockholm, Sweden
- Founded in 2005; nearly 300 employees in 2016
- Mandate to 'identify, assess and communicate current and emerging threats to human health from communicable diseases'
- European Union (EU) (28) and European Economic Area (EEA) (3) = 31 countries with a total of more than 500 million people

Surveillance of antimicrobial resistance in human bacteria infections in the EU/EEA

- **European Antimicrobial Resistance Surveillance Network (EARS-Net)**
- European Surveillance of Antimicrobial Consumption (ESAC-Net)
- Healthcare-Associated Infections surveillance Network (HAI-Net)
- **Food- and Waterborne Diseases and Zoonoses Network (FWD-Net)**
- **European Tuberculosis Surveillance Network**
- **European Gonococcal Antimicrobial Surveillance Programme (Euro-GASP)**

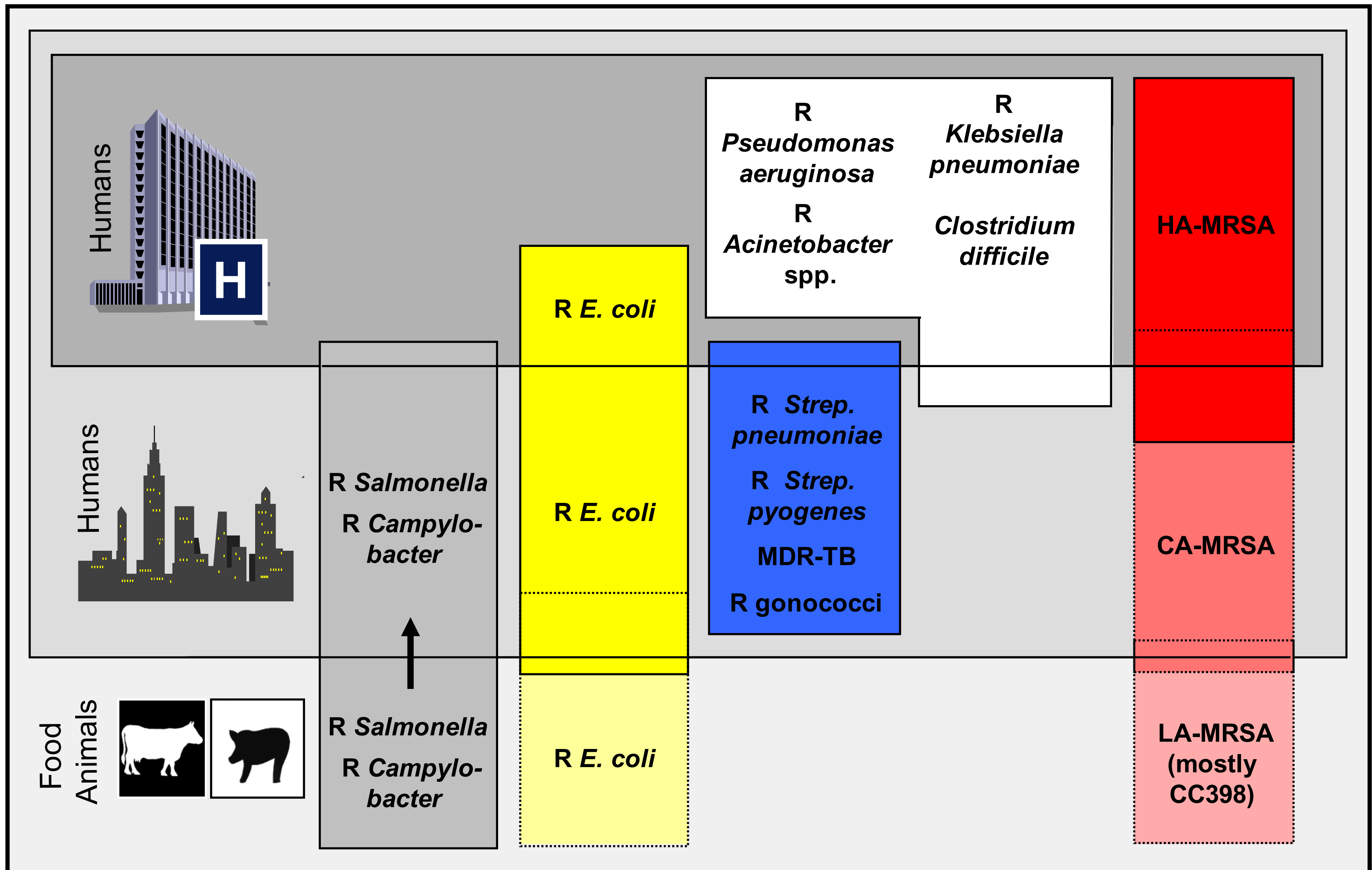
Antimicrobial resistance surveillance and related data at ECDC



Surveillance and Response Support Unit, and in particular:

- **Antimicrobial Resistance and Healthcare-Associated Infections (ARHAI) disease programme**
Liselotte Diaz Högberg, Ole Heuer, Klaus Weist, Carl Suetens, Pete Kinross, Tommi Kärki, Diamantis Plachouras, Alessandro Cassini, Anke Kohlenberg, Margot Einöder-Moreno
- **Food- and Waterborne and Zoonoses disease programme**
Therese Westrell, Johanna Takkinen
- **Tuberculosis disease programme**
Vahur Hollo, Csaba Ködmön, Marieke van der Werf
- **HIV, AIDS, STIs and viral Hepatitis disease programme**
Gianfranco Spiteri, Andrew Amato-Gauci
- **Epidemiological methods (incl. Surveillance data services)**
Gaëtan Guyodo, Frantiska Hrubá, Encarna Gimenez, Ana Hoxha, Catalin Albu, Bruno Ciancio

Compartments of antimicrobial resistance

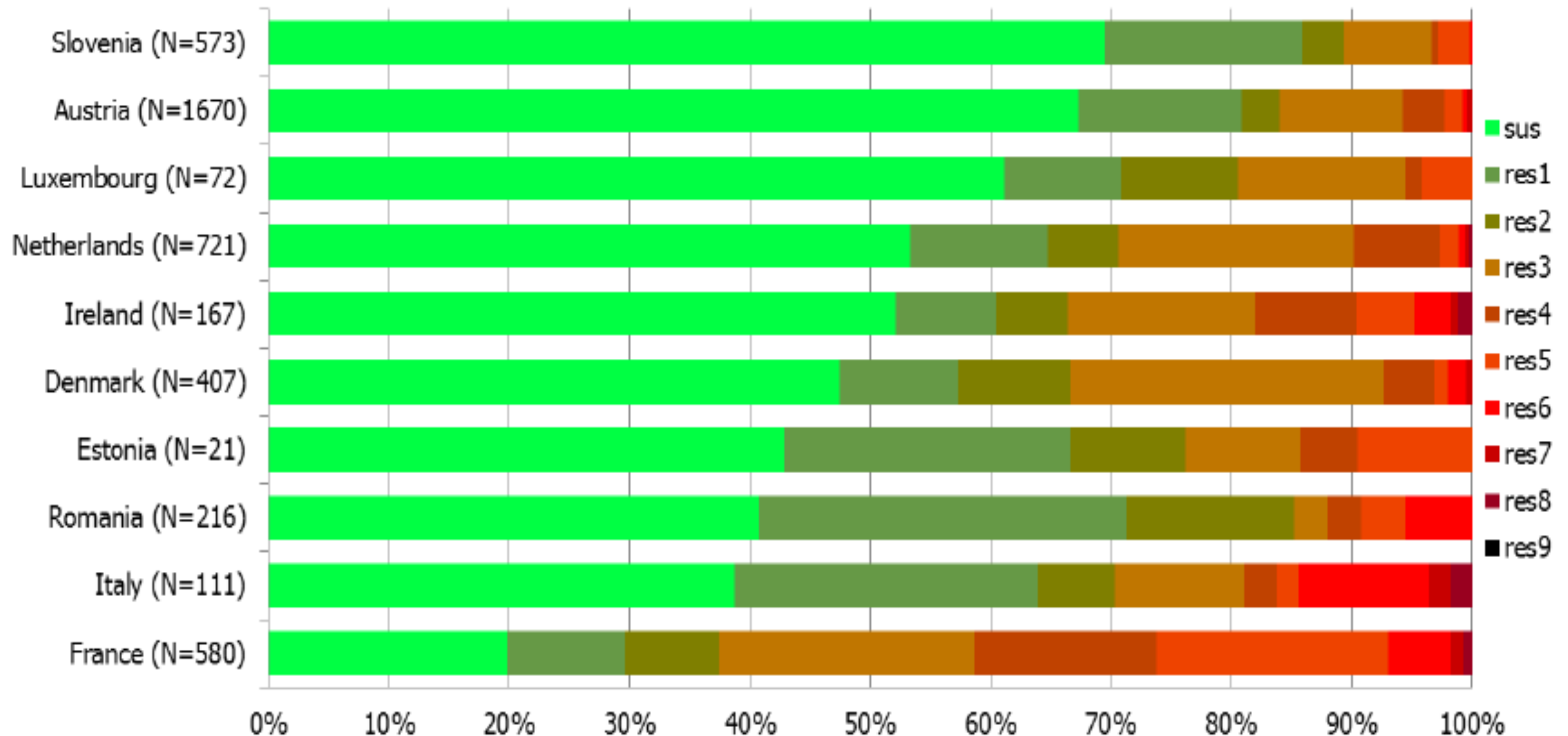


Foodborne infections



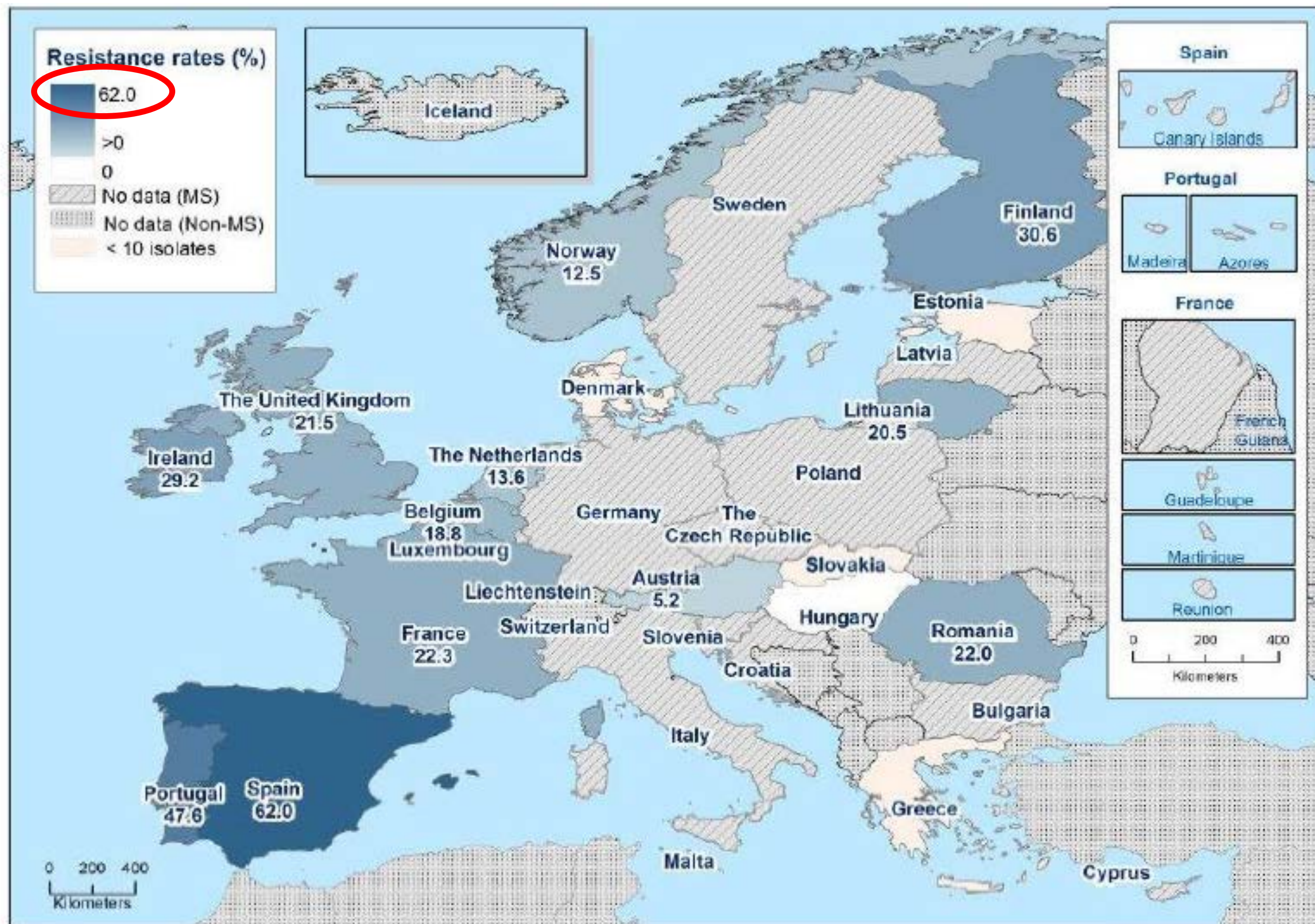
Photo: US Dept. of Agriculture

Salmonella spp.: frequency distribution of isolates from fully susceptible to resistant to eight antimicrobial groups; EU/EEA, 2014

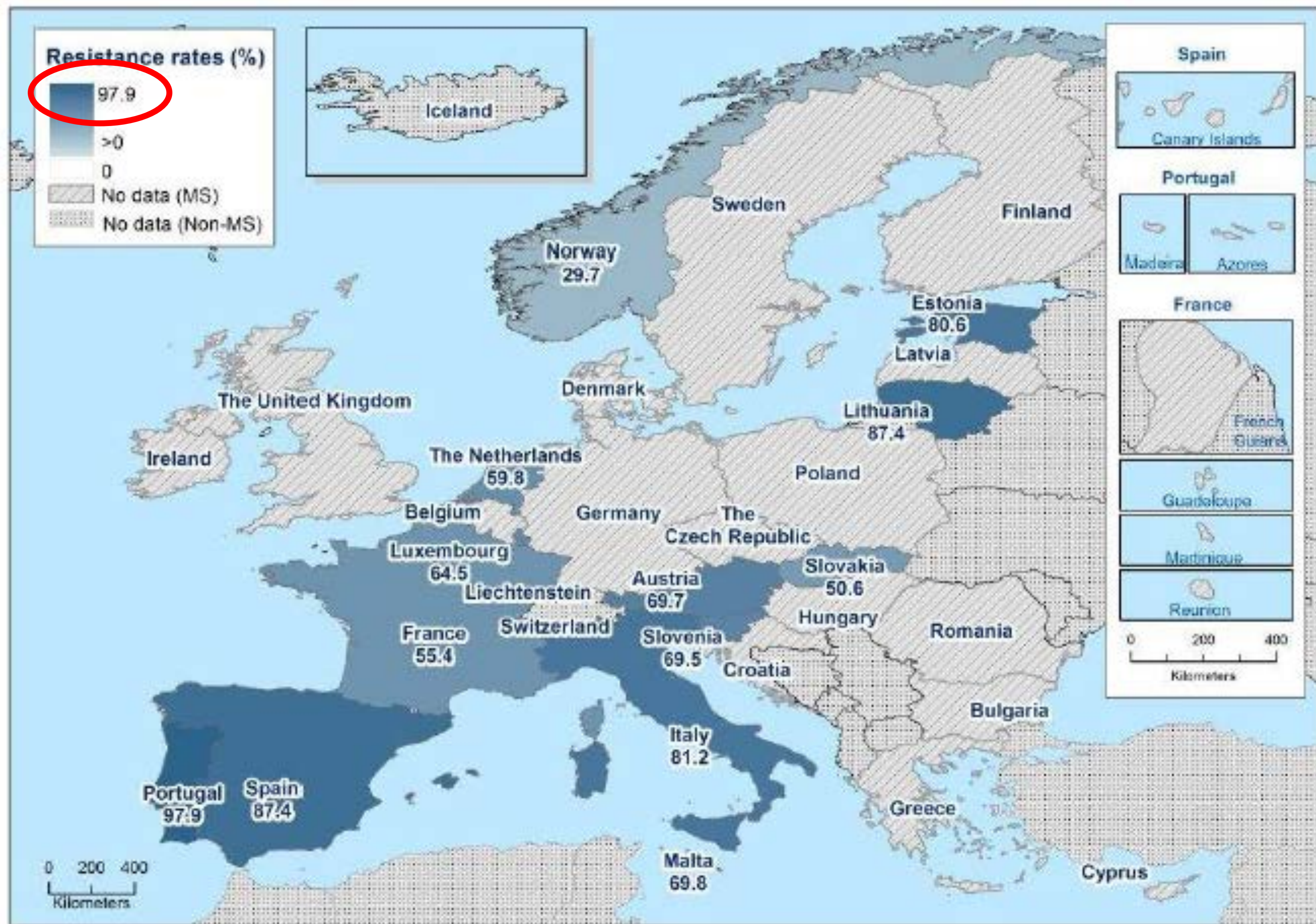


N: total number of isolates tested for susceptibility against the whole common antimicrobial set for *Salmonella*; sus: susceptible to all antimicrobial classes of the common set for *Salmonella*; res1–res9: resistance to one up to nine antimicrobial classes of the common set for *Salmonella*.

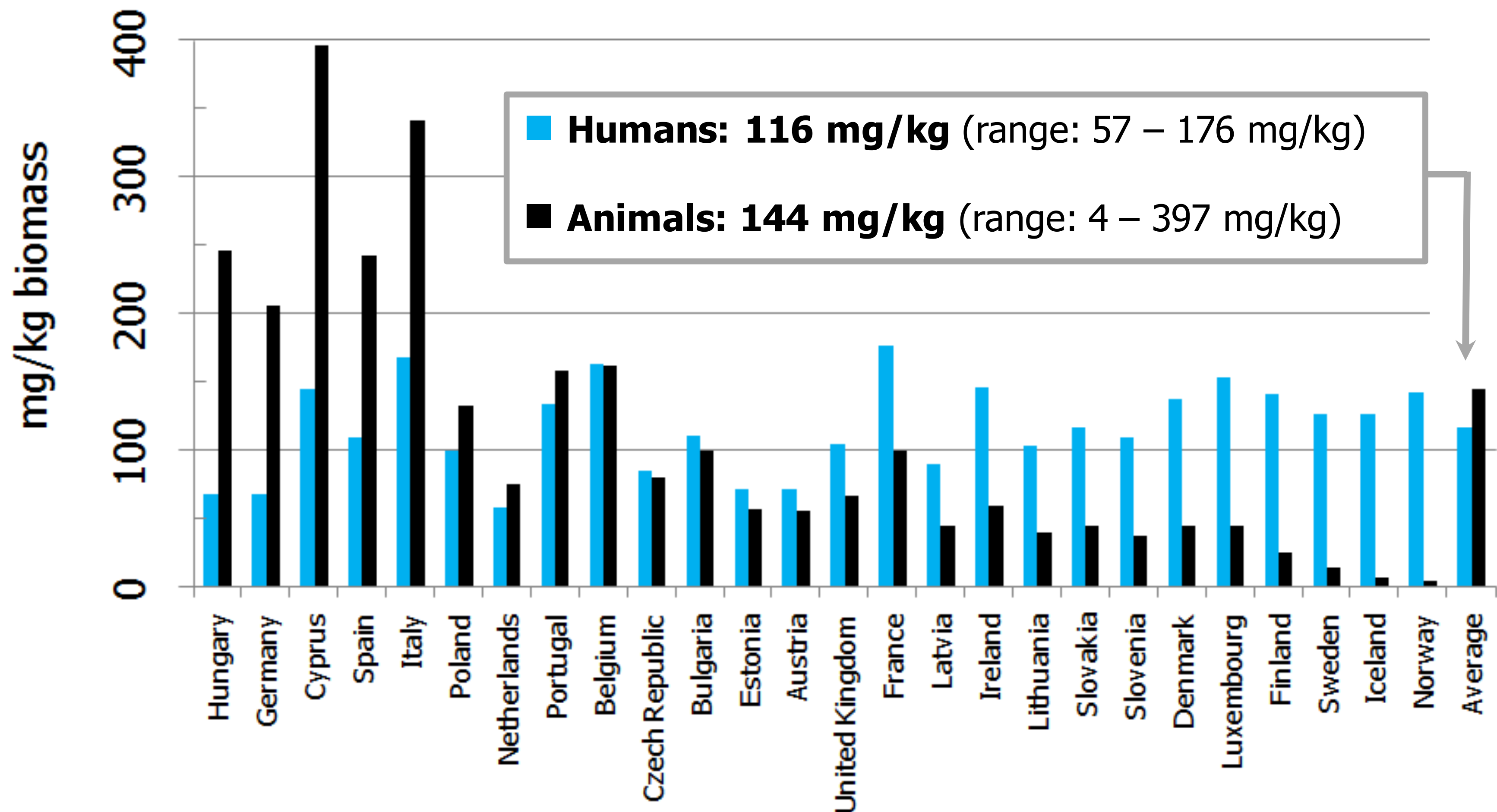
***Salmonella* Enteritidis: percentage of isolates resistant to nalidixic acid; EU/EEA, 2014**



Campylobacter jejuni: percentage of isolates resistant to ciprofloxacin; EU/EEA, 2014



Biomass-corrected antimicrobial consumption in humans and animals, EU/EEA, 2012



COMPARISON OF ANTIMICROBIAL CONSUMPTION AND RESISTANCE **IN ANIMALS**

Bacteria	Antimicrobial class	P-value
Indicator <i>E. coli</i>	Tetracyclines	<0.05
	3 rd -generation cephalosporins	<0.05
	Fluoroquinolones	<0.05
	Fluoroquinolones & quinolones	<0.05
<i>C. jejuni</i> and <i>C. coli</i>	Tetracyclines	<i>C. jejuni</i> : <0.05
	Macrolides	<i>C. jejuni</i> : <0.05 <i>C. coli</i> : <0.05
	Fluoroquinolones	<i>C. jejuni</i> : <0.05
	Fluoroquinolones & quinolones	<i>C. jejuni</i> : <0.05
<i>Salmonella</i> spp.	Tetracyclines	<0.05
	3 rd -generation cephalosporins	<0.05
	Fluoroquinolones	NS
	Fluoroquinolones and other quinolones	<0.05

COMPARISON OF ANTIMICROBIAL CONSUMPTION AND RESISTANCE **IN HUMANS**

Bacteria	Antimicrobial class	P-value
Invasive <i>E. coli</i>	3 rd - and 4 th -gen. cephalosp. (community consumpt.)	0.05
	3 rd - and 4 th -gen. cephalosp. (hospital consumption)	<0.05
	Fluoroquinolones (community consumption)	<0.0001
	Fluoroquinolones (hospital consumption)	NS
Invasive <i>K. pneumoniae</i>	Carbapenems (mostly hospital consumption)	0.002
<i>Salmonella</i> spp.	Tetracyclines (total consumption)	NS
	Fluoroquinolones (total consumption)	NS
	3 rd - and 4 th -gen. cephalosp. (hospital consumption)	<0.05*
<i>Campylobacter</i> spp.	Fluoroquinolones (total consumption)	NS
<i>C. jejuni</i>	Tetracyclines (community consumption)	NS
<i>C. coli</i>	Macrolides (total consumption)	<0.05*
	Fluoroquinolones (community consumption)	<0.05*

*Must be interpreted with caution (limited available data on resistance and on consumption)

Joint Interagency Antimicrobial Consumption and Resistance Analysis (JIACRA) Report



ECDC/EFSA/EMA first joint report on the integrated analysis of the consumption of antimicrobial agents and occurrence of antimicrobial resistance



**2nd JIACRA report:
30 June 2017**

Community

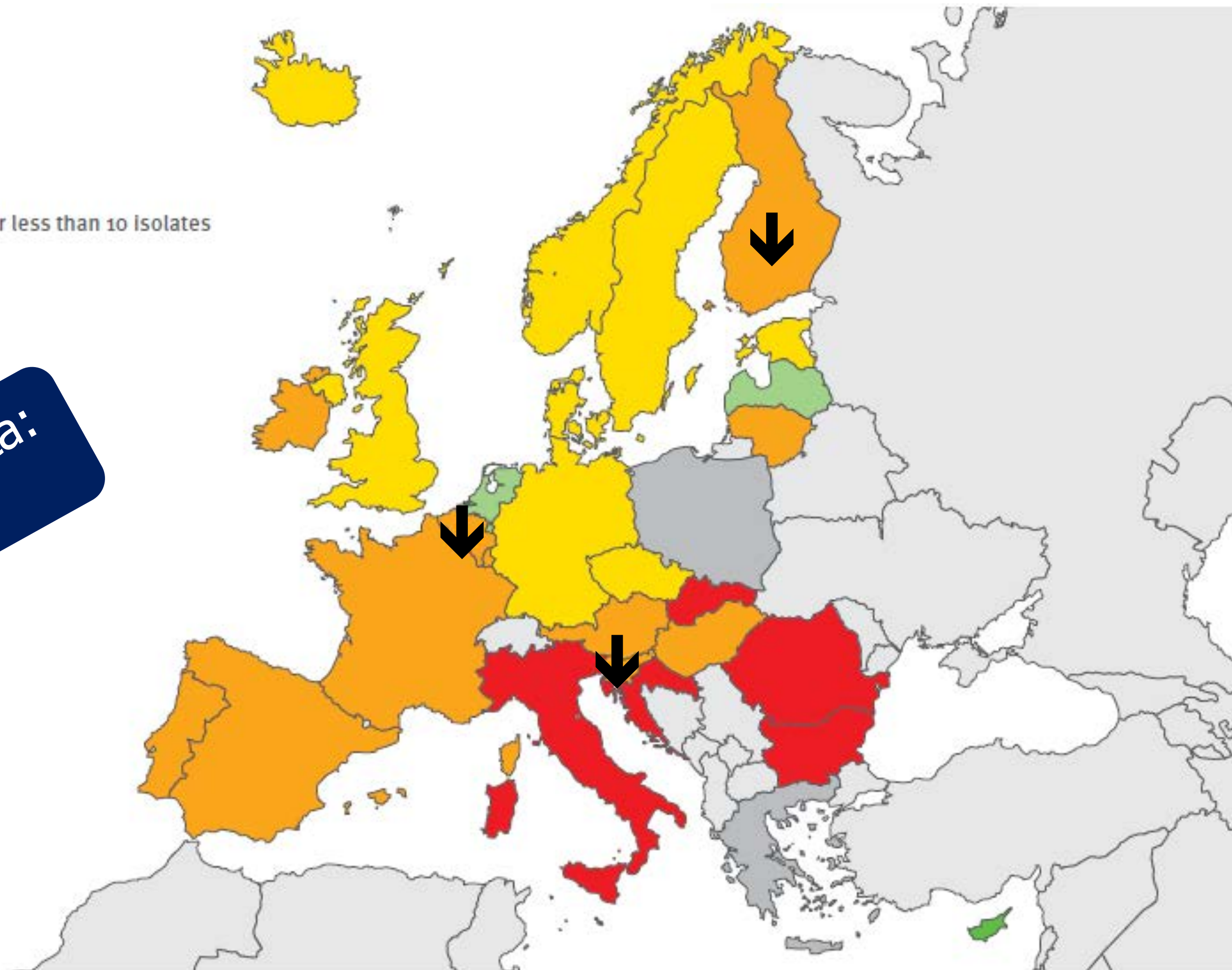


European Antimicrobial Resistance Surveillance Network (EARS-Net)



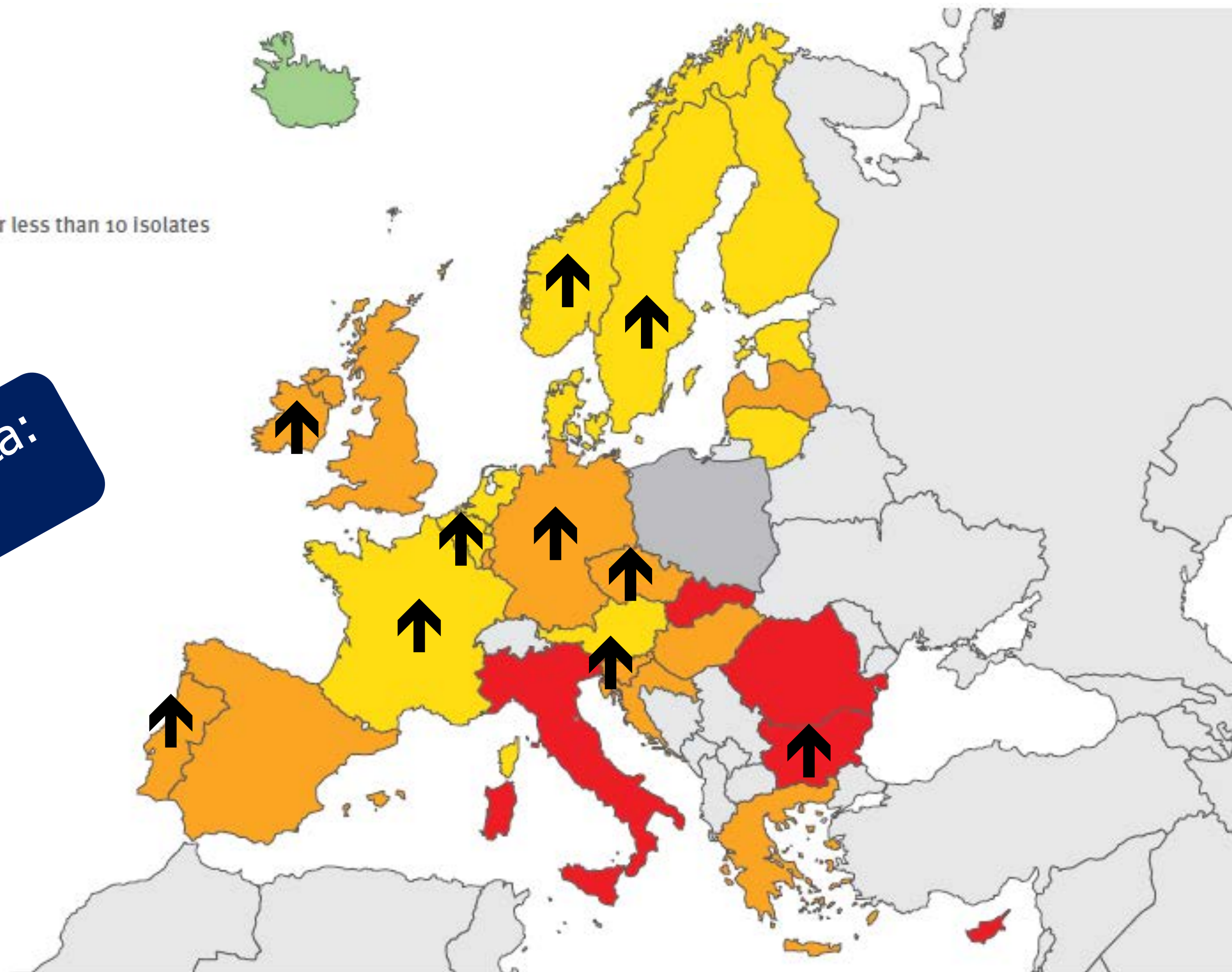
- Eight pathogens chosen based on their frequency and public health importance:
 - *Streptococcus pneumoniae*, *Escherichia coli*
 - *Staphylococcus aureus*, *Enterococcus faecium*, *Enterococcus faecalis*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Acinetobacter* spp.
- Data on "invasive" isolates (blood and cerebrospinal fluid)
- First isolate for each patient, species and year
- Selected antimicrobials, SIR interpretation, MICs
- Attempts to collect denominator data: e.g. catchment population.

***Streptococcus pneumoniae*: percentage of invasive isolates not susceptible to macrolides; EU/EEA, 2014**



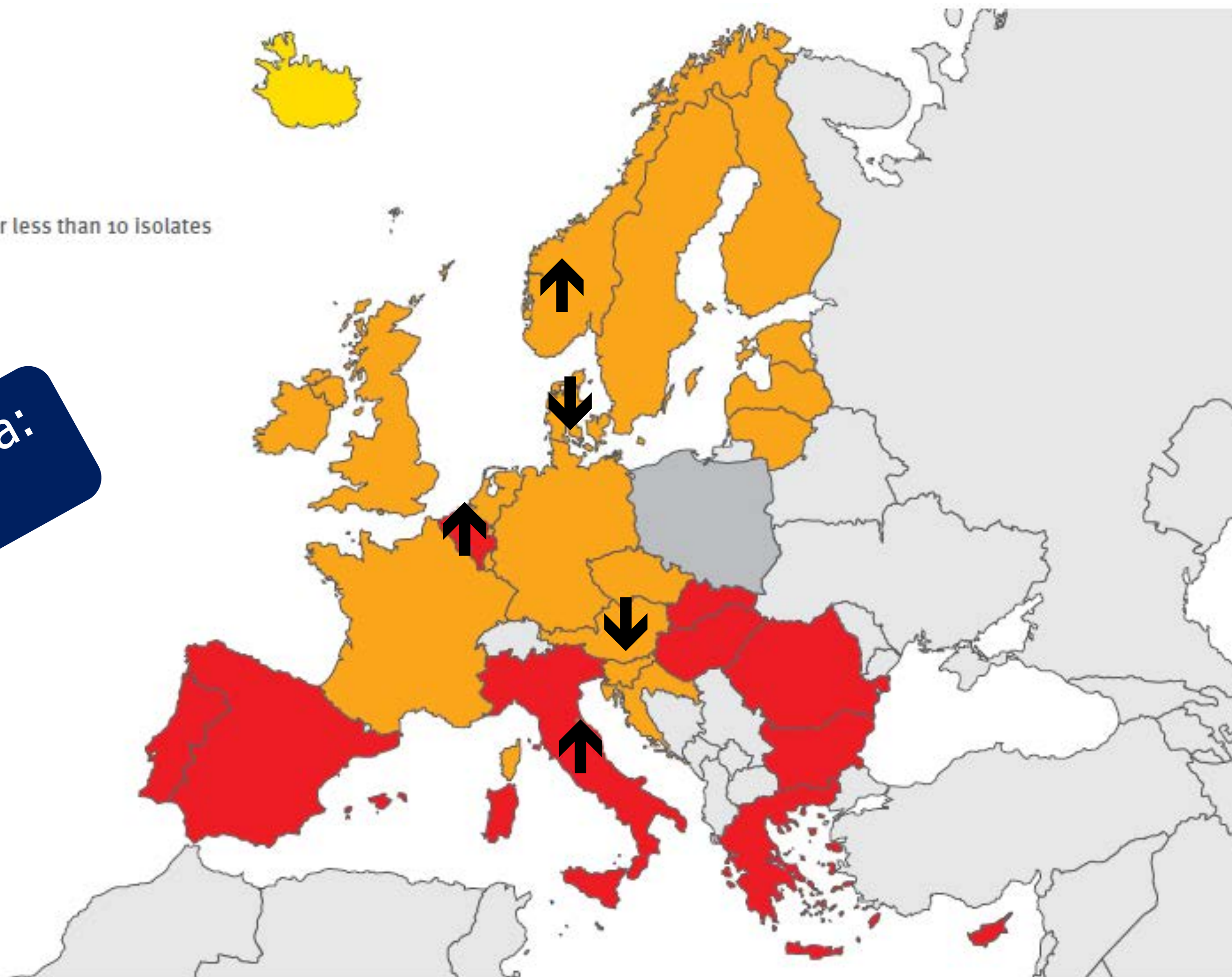
Update with 2015 data:
18 Nov. 2016

Escherichia coli: percentage of invasive isolates resistant to third-generation cephalosporins; EU/EEA, 2014



Update with 2015 data:
18 Nov. 2016

Escherichia coli: percentage of invasive isolates resistant to fluoroquinolones; EU/EEA, 2014

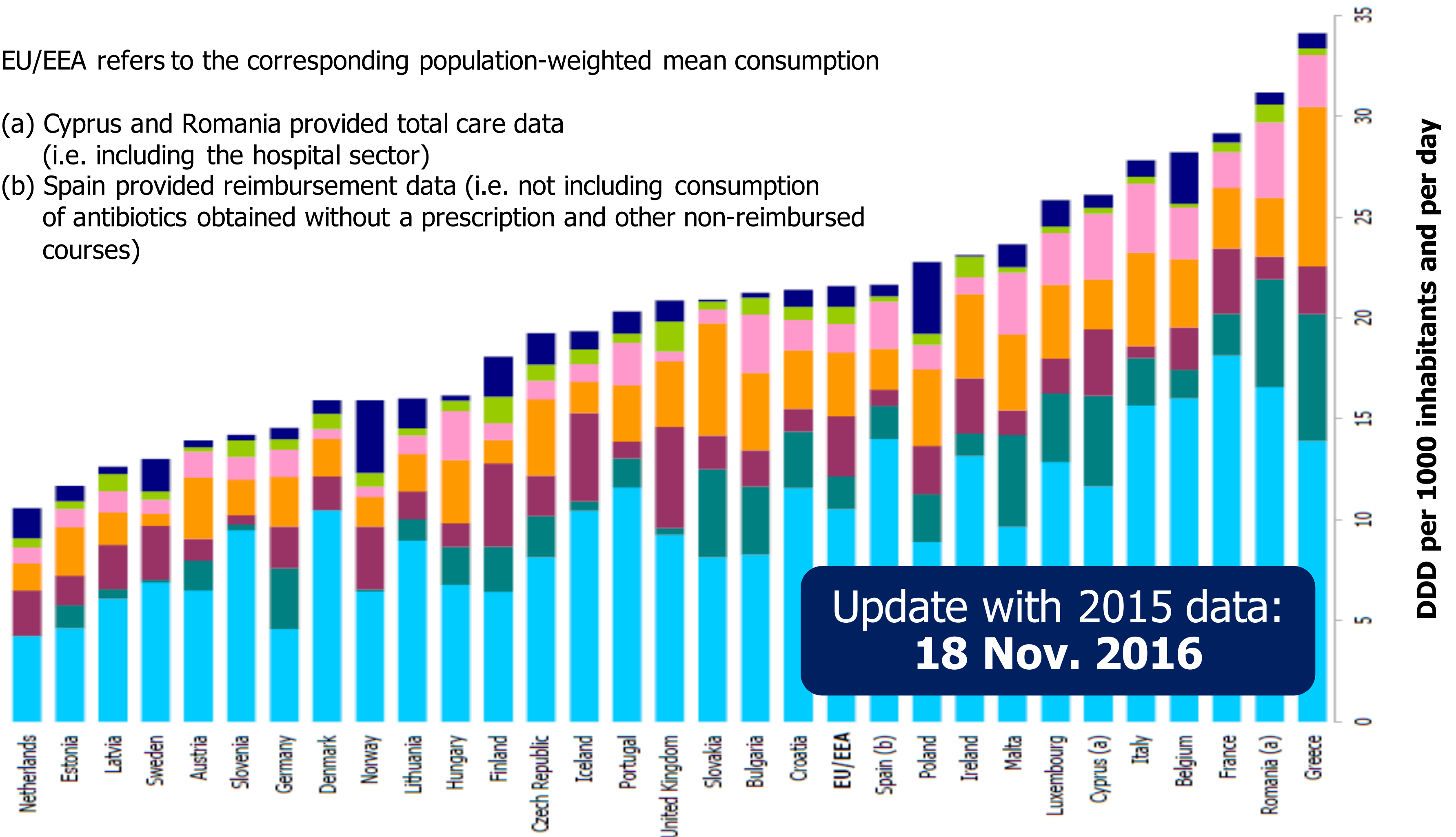


Update with 2015 data:
18 Nov. 2016

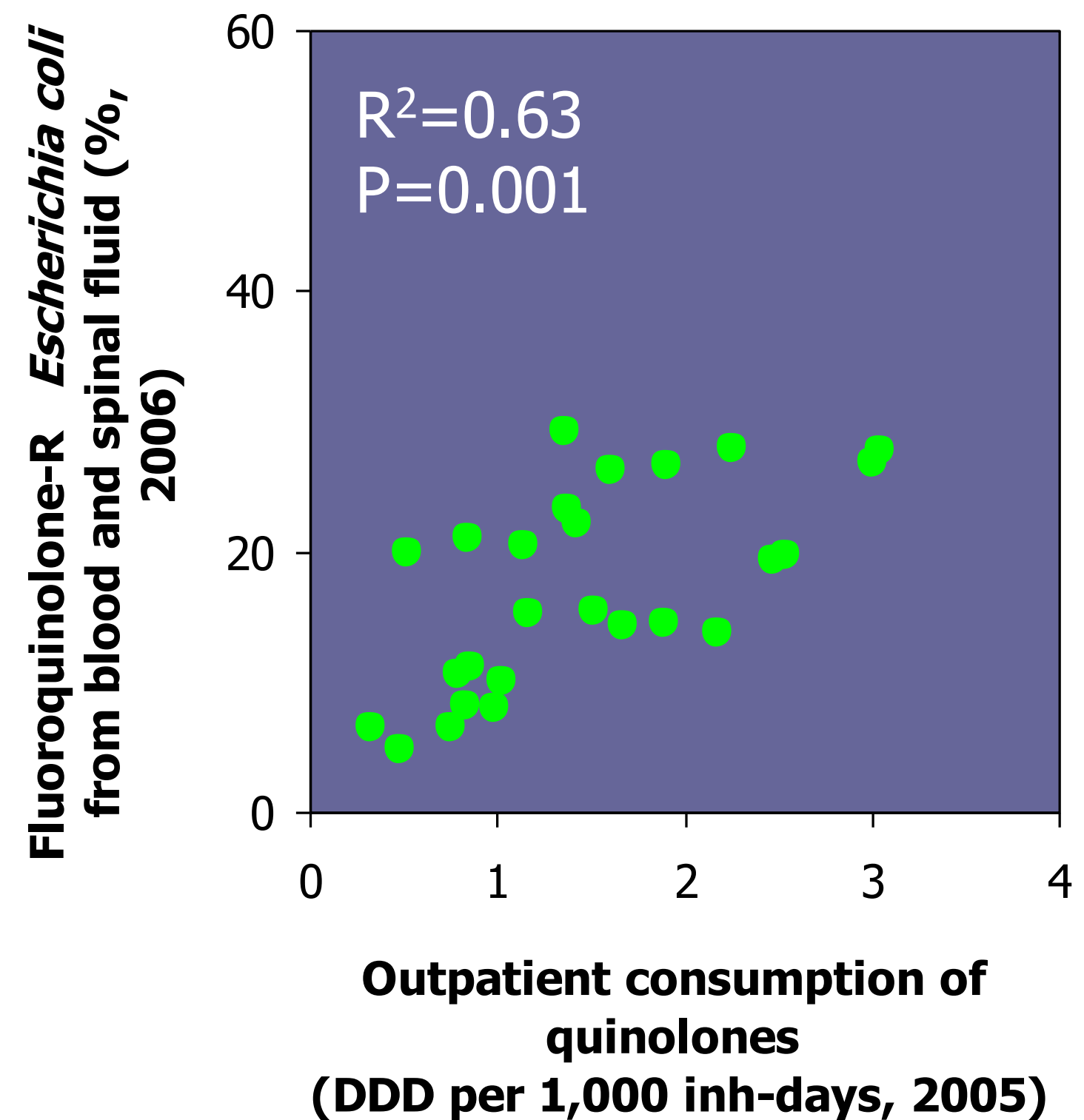
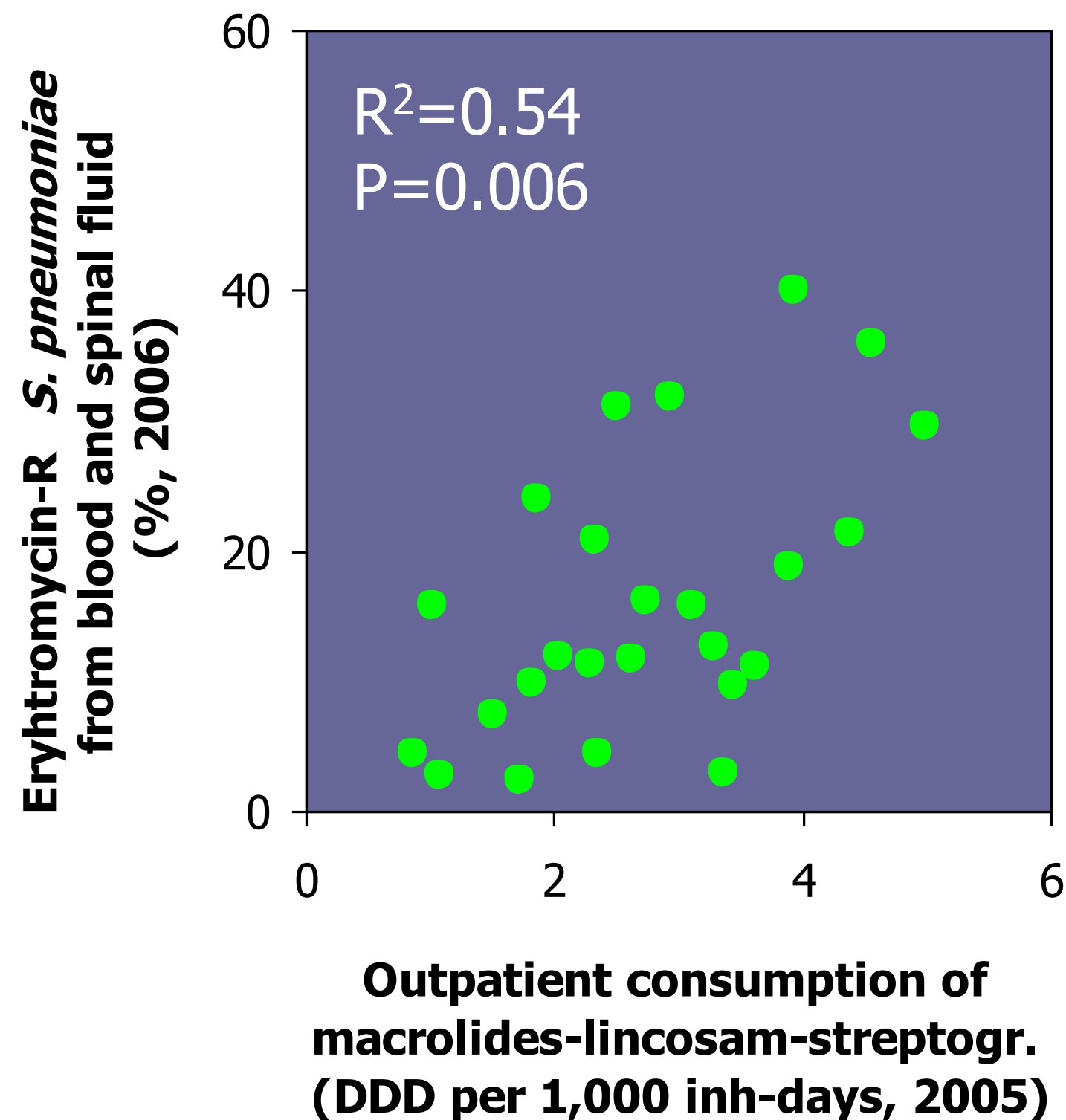
Consumption of antibiotics for systemic use (ATC group J01) in the community, EU/EEA, 2014

EU/EEA refers to the corresponding population-weighted mean consumption

- (a) Cyprus and Romania provided total care data (i.e. including the hospital sector)
- (b) Spain provided reimbursement data (i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses)



Relationship between antibiotic use and resistance in the community

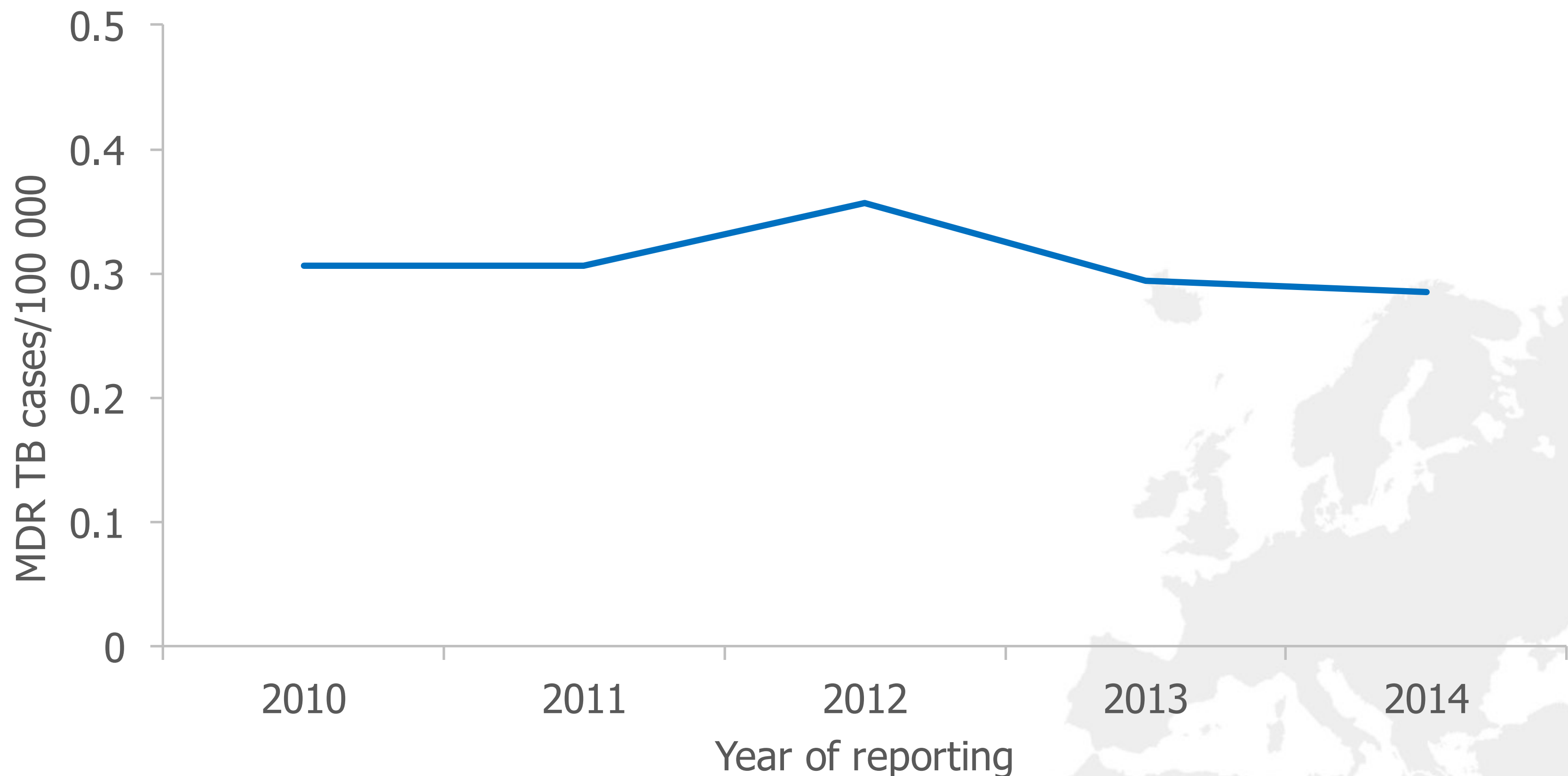


Multidrug-resistant* tuberculosis (MDR TB) notification rate, EU/EEA, 2010 – 2014



Rate was stable at **0.3** per 100 000 population between 2010 and 2014

*MDR: resistant to at least isoniazid and rifampicin



Multidrug-resistant* tuberculosis (MDR TB) EU/EEA, 2014



4.0% of TB cases with drug susceptibility test results for isoniazid and rifampicin were multidrug-resistant (range 0–25.8%)

< 1%

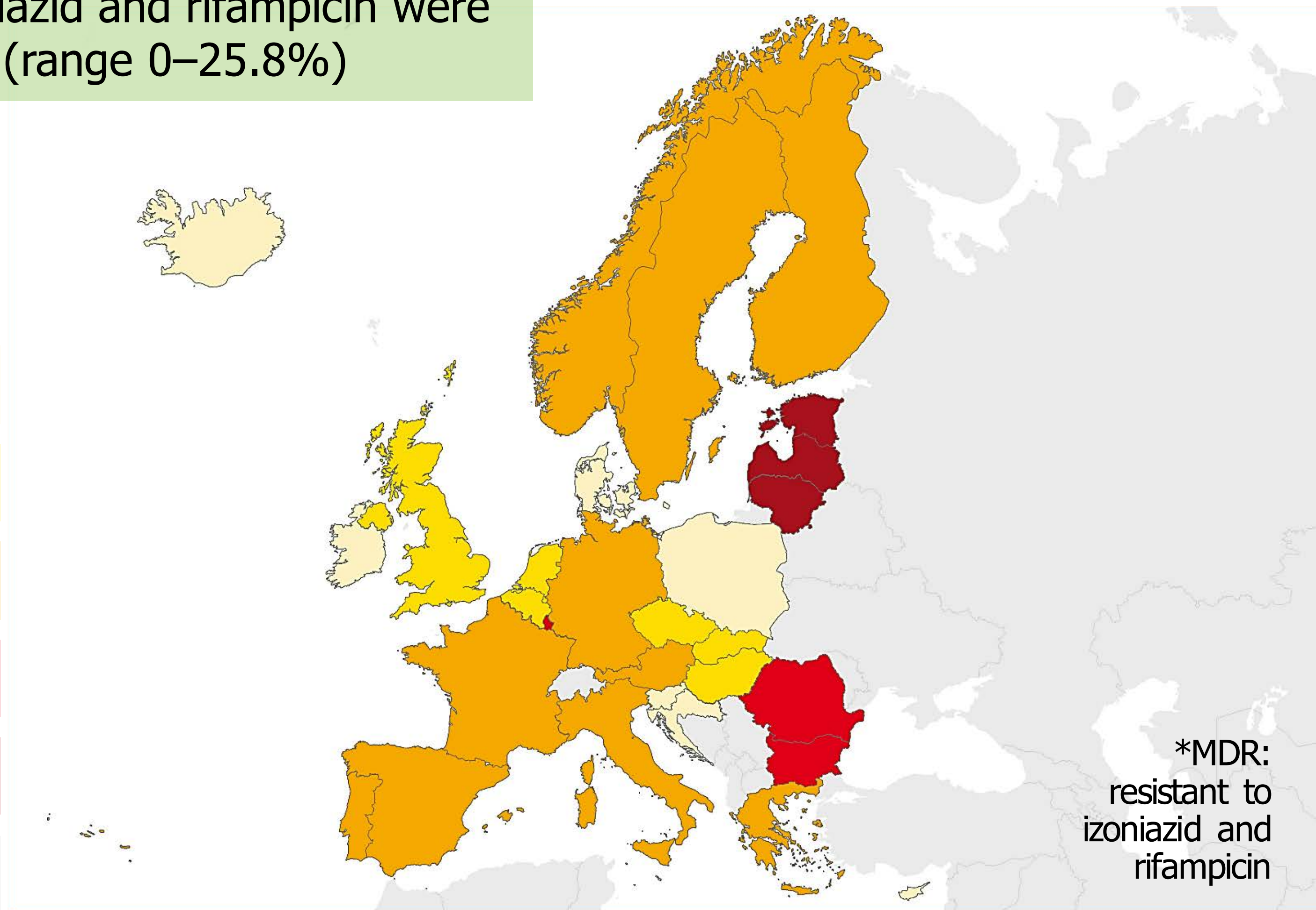
1 to 1.9%

2 to 4.9%

5 to 9.9%

≥ 10%

Not reporting



*MDR:
resistant to
isoniazid and
rifampicin

You are here: [Portal Home](#) > [English](#) > [Data & Tools](#) > Surveillance Atlas of Infectious Diseases

Surveillance Atlas of Infectious Diseases



About the Surveillance Atlas

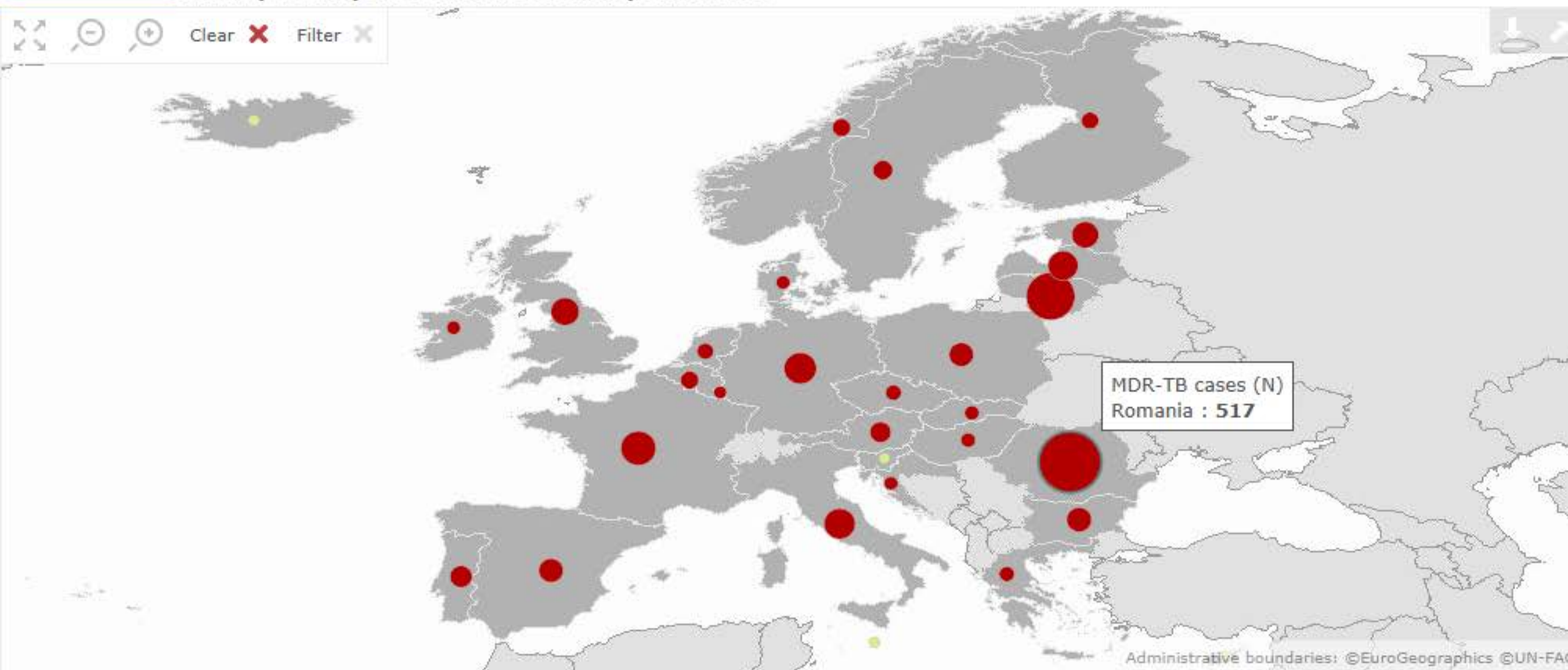
The Surveillance Atlas of Infectious Diseases is a web-based tool for easy access to European infectious disease surveillance data. It aims at improving availability and accessibility of data, providing it in a user-friendly way (maps, diagrams, time series, distributions, tables). Indicators are set individually for each disease to ensure better information for action in the prevention and control of infectious diseases. You can search information by disease, region or period. It aims at improving availability and accessibility of data, providing it in a user-friendly way (maps, diagrams, time series, distributions, tables). Indicators are set individually for each disease to ensure better information for action in the prevention and control of infectious diseases. You can search information by disease, region or period. **Currently the Atlas contains information on tuberculosis, invasive Haemophilus influenzae disease, invasive meningococcal disease, measles and rubella; additional diseases will be added gradually.**

To start, choose data below:

Choose Data

Tuberculosis - All cases - MDR-TB cases

Data by Country and Year. Current time period: 2014



MDR-TB cases (N)

Value range: 1 - 849



0

No data

Table

Extensively drug-resistant* TB (XDR TB), EU/EEA, 2014

17.5% of MDR TB cases with 2nd line drug susceptibility test results were extensively drug-resistant (range 0–50.0% and 5.7–26.1% for countries reporting more than one case)

< 1%

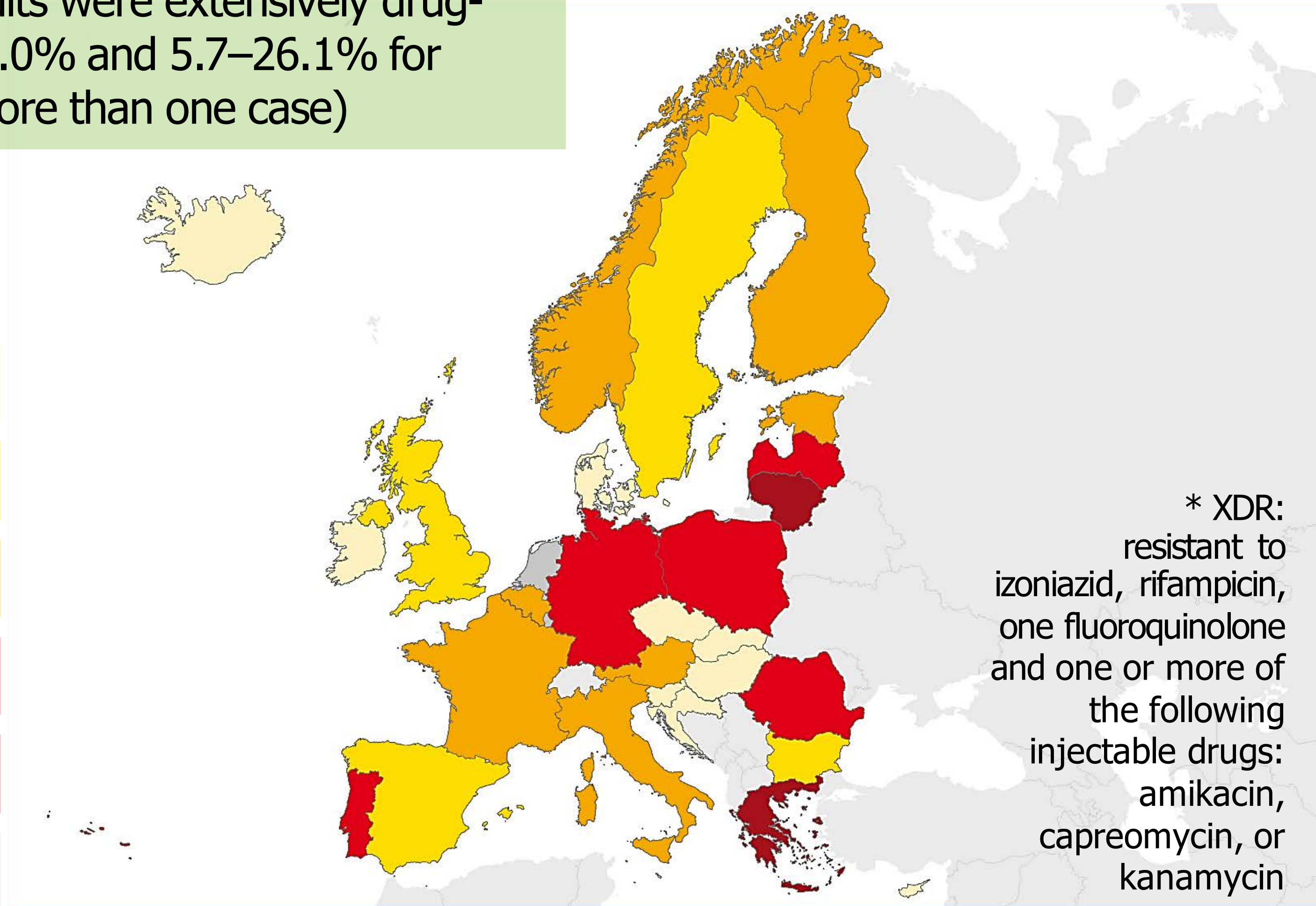
1 to 9.9%

10 to 14.9%

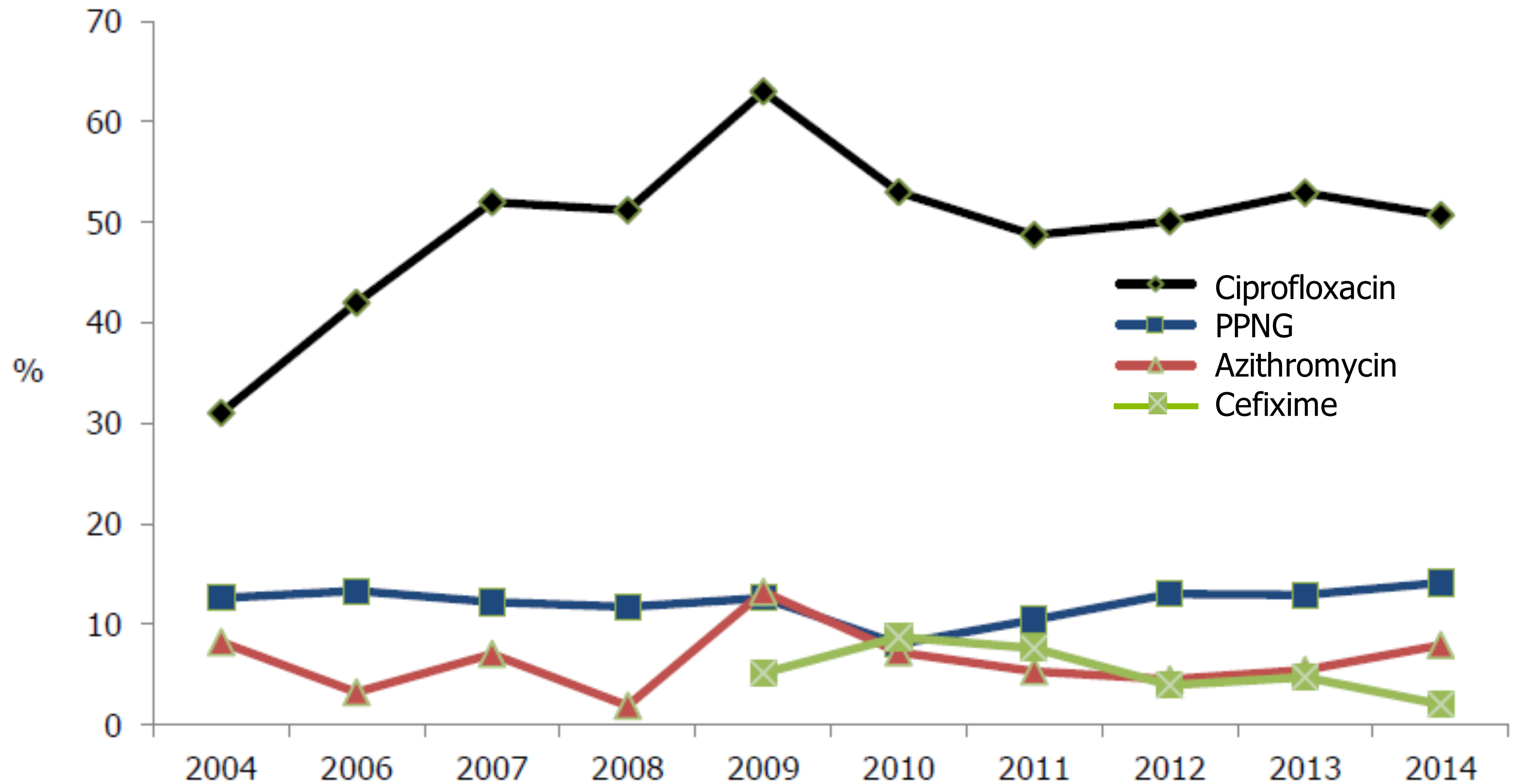
15 to 24.9%

≥ 25%

Not reporting

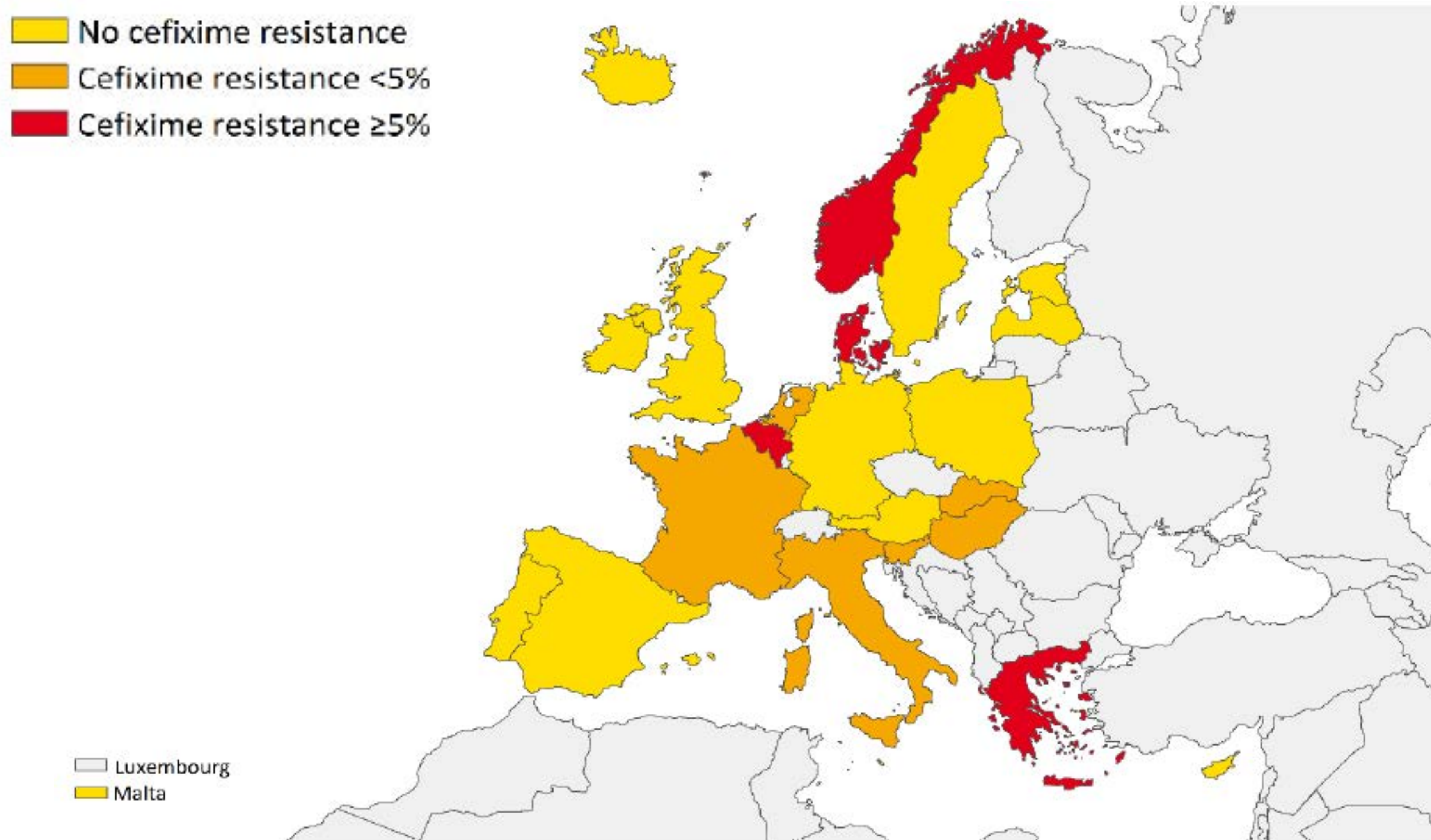


Neisseria gonorrhoeae: percentage antimicrobial-resistant; EU/EEA, 2004-2014



PPNG: penicillinase-producing *N. gonorrhoeae*

***Neisseria gonorrhoeae*: percentage resistant to cefixime; EU/EEA, 2014**

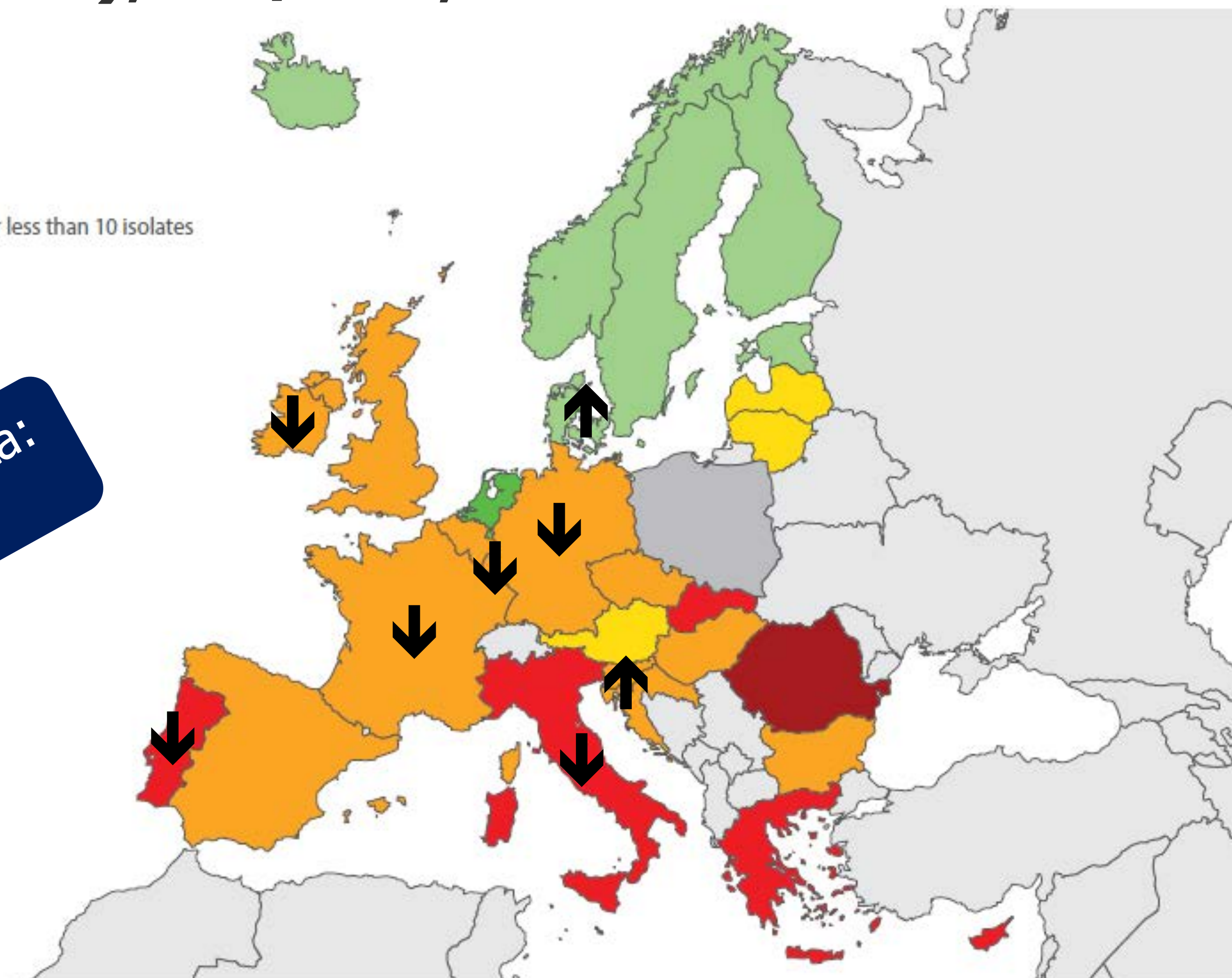


Hospitals



Photo: Luis García

Staphylococcus aureus: percentage of invasive isolates resistant to meticillin (MRSA); EU/EEA, 2014

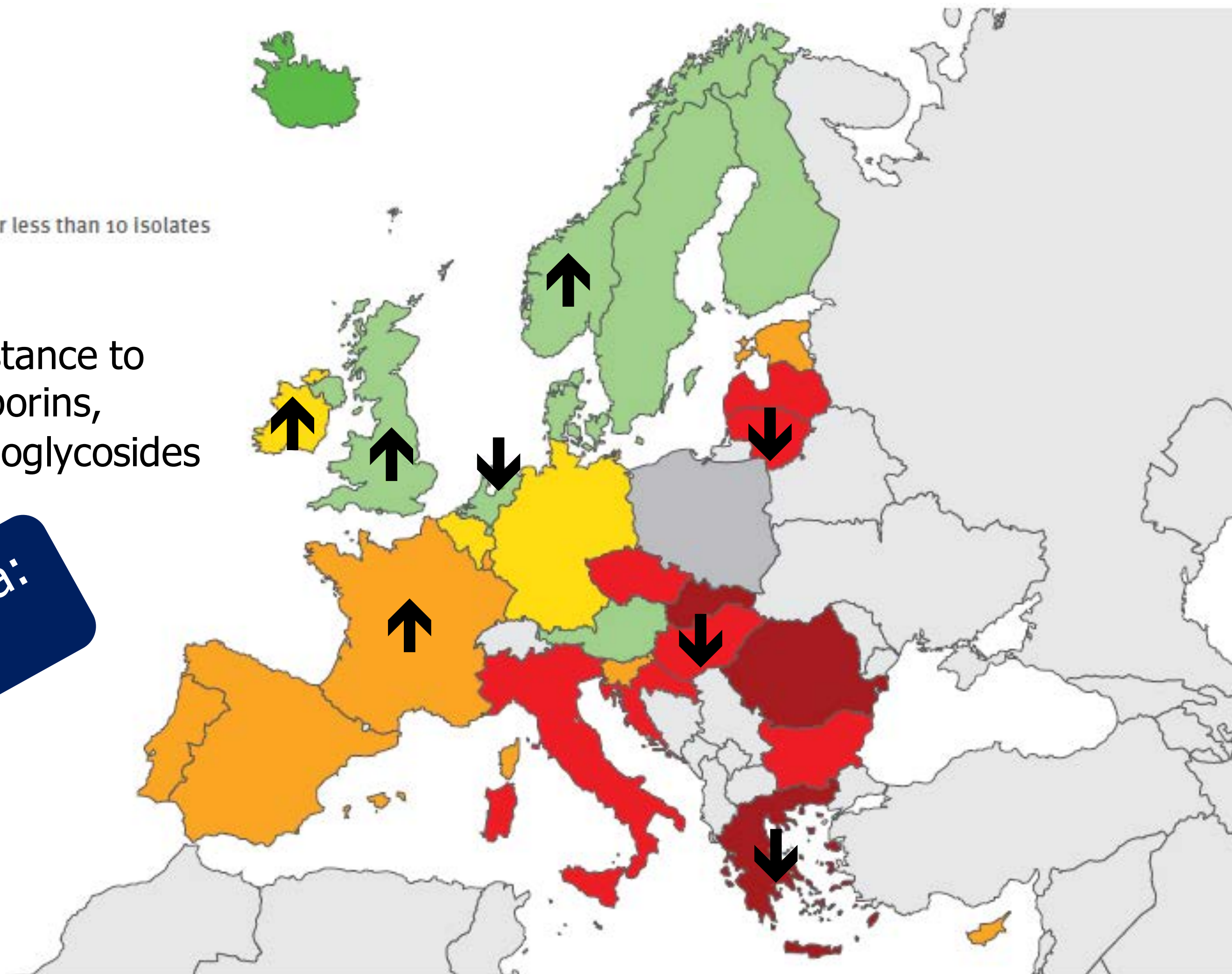


Update with 2015 data:
18 Nov. 2016

Klebsiella pneumoniae: percentage of invasive isolates with combined resistance*; EU/EEA, 2014



*Combined resistance: resistance to
third-generation cephalosporins,
fluoroquinolones and aminoglycosides

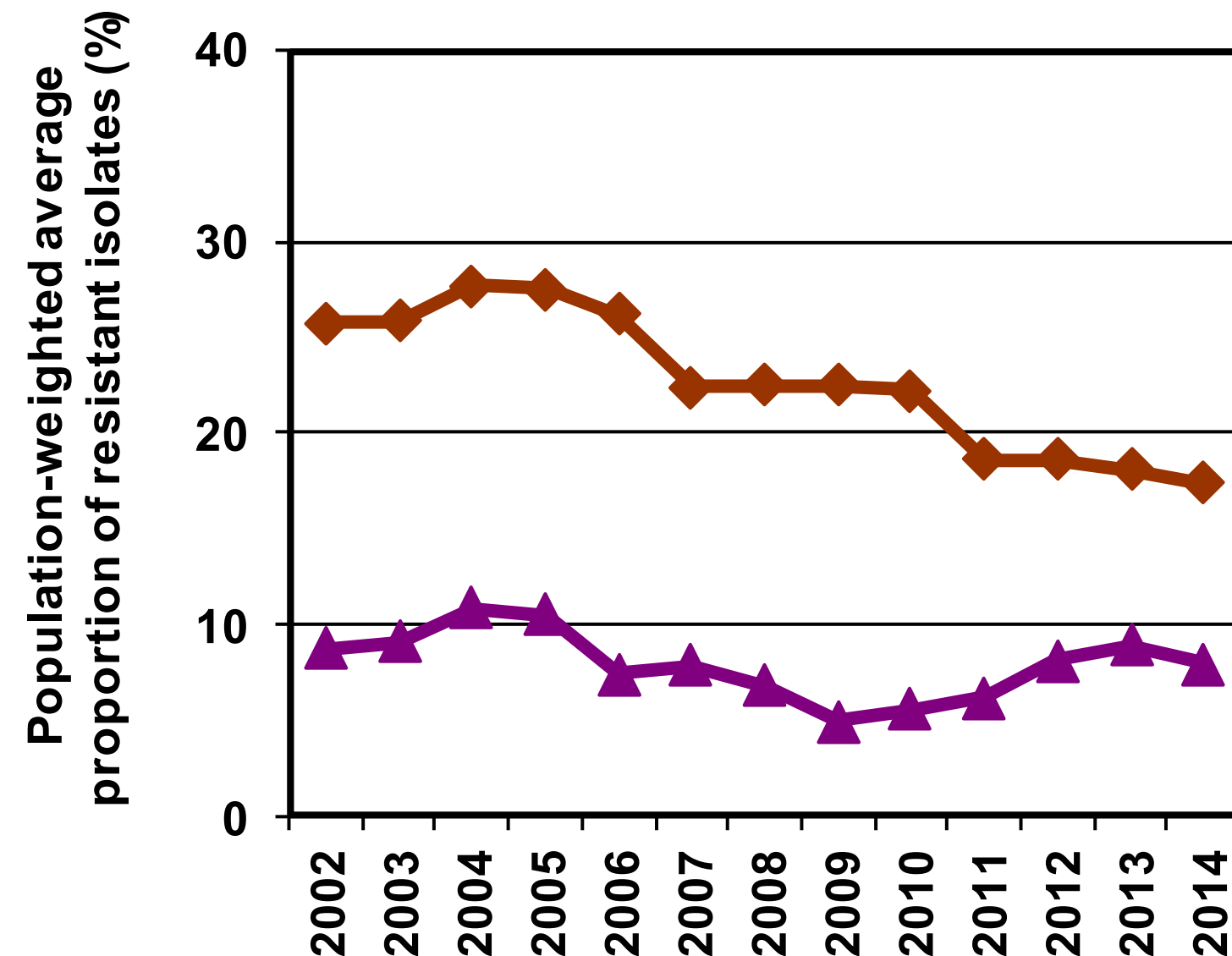


Update with 2015 data:
18 Nov. 2016

Non-visible countries
Liechtenstein
Luxembourg
Malta

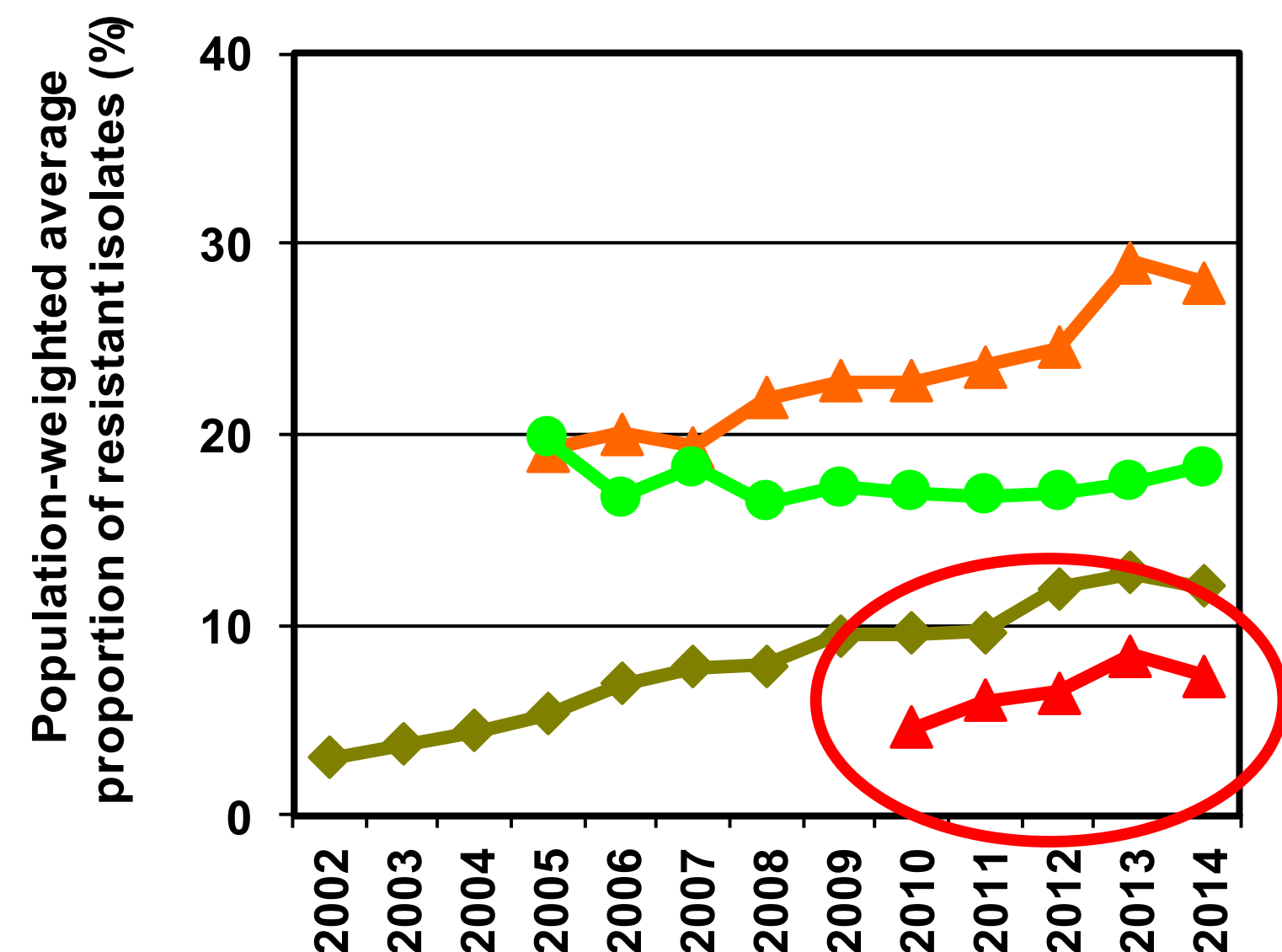
Population-weighted, average %resistant isolates among bacteria from bloodstream infections (and meningitides), EU/EEA, 2002-2014

Gram-positive bacteria



- ◆ Meticillin-resistant *S. aureus* (MRSA)
- ▲ Vancomycin-resistant *E. faecium*

Gram-negative bacteria



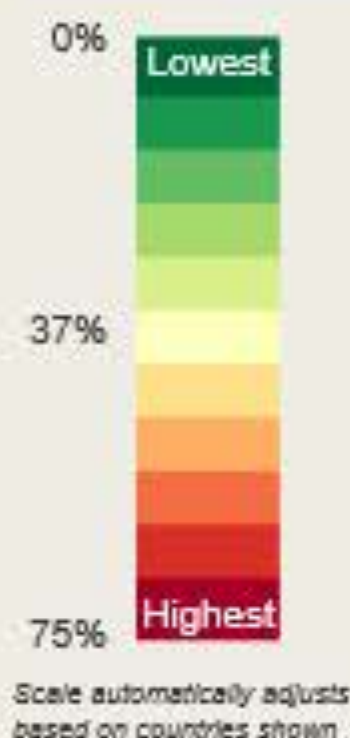
- ◆ Third-gen. cephalosporin-resistant *E. coli*
- ▲ Third-gen. ceph.-resistant *K. pneumoniae*
- ▲ Carbapenem-resistant *K. pneumoniae*
- Carbapenem-resistant *P. aeruginosa*

Acquired resistance of *Klebsiella pneumoniae* to antibiotics

Klebsiella pneumoniae is a type of bacteria that can cause different types of healthcare-associated infections, including pneumonia, bloodstream and wound infections, and meningitis. In healthcare settings, *Klebsiella* infections commonly occur among sick patients who are receiving treatment for other conditions.

Update with 2015 data:
18 Nov. 2016

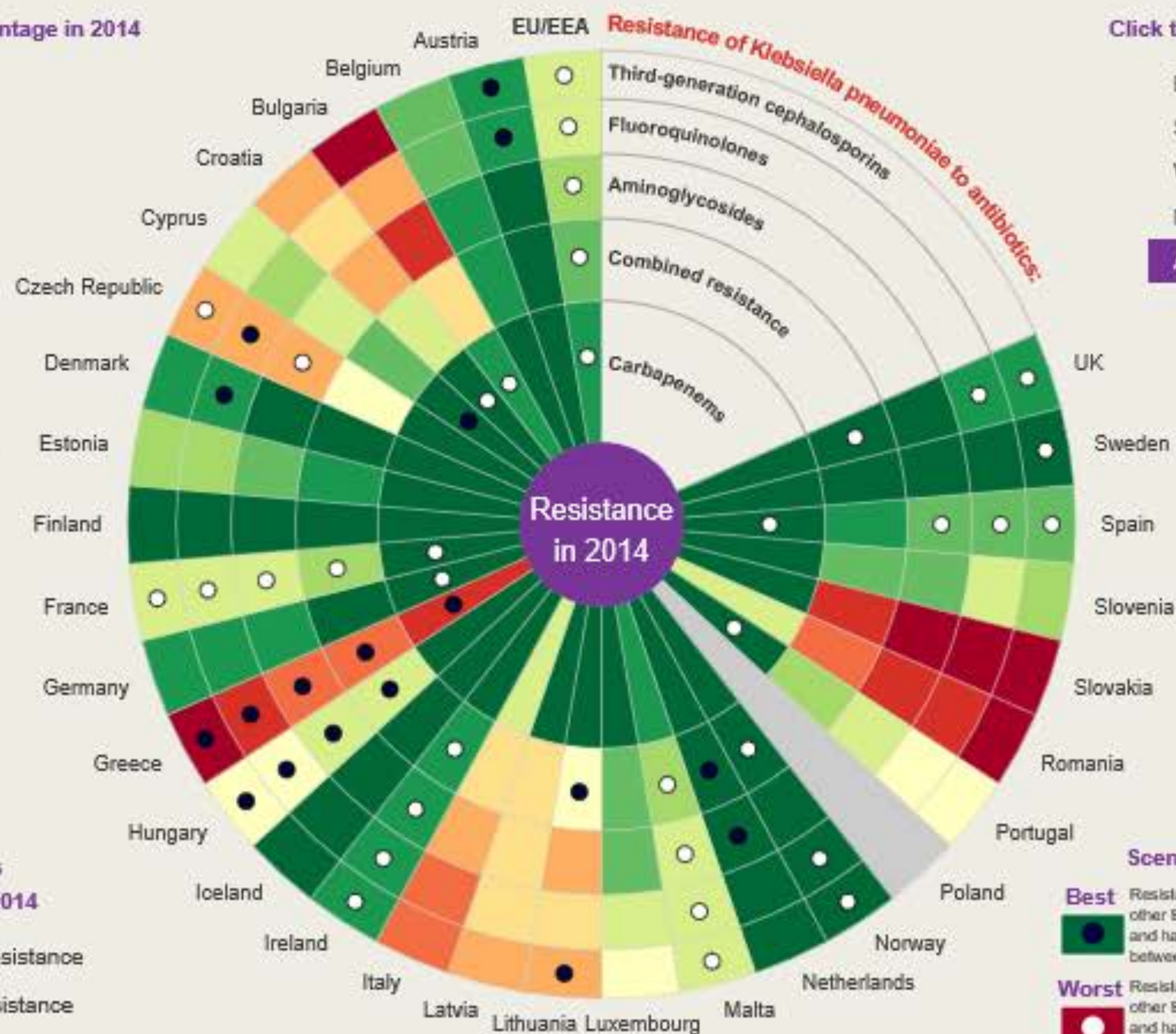
Resistance percentage in 2014



No data or
<10 isolates

Significant trends between 2011 & 2014

- Decreasing resistance
- Increasing resistance



Click to narrow by region:

- Eastern Europe
- Southern Europe
- Western Europe
- Northern Europe
- All countries

Scenarios:

- Best** Resistance is low, compared to the other EU/EEA member states shown, and has been on a decreasing trend between 2011 and 2014.
- Worst** Resistance is high, compared to the other EU/EEA member states shown, and has been on an increasing trend between 2011 and 2014.

CAESAR Network

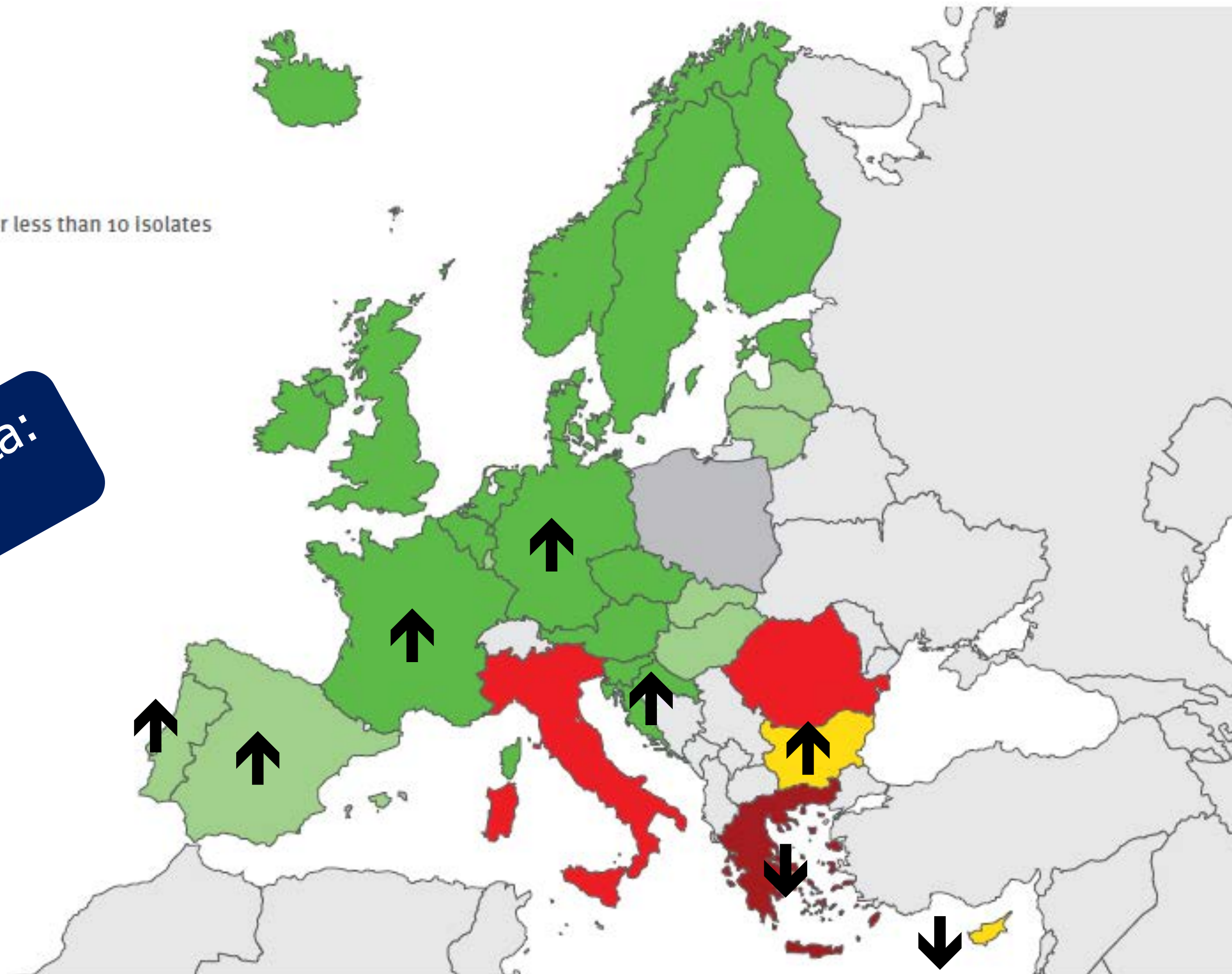
(Central Asian and eastern European Surveillance of Antimicrobial Resistance)



- Network of national surveillance networks in non-EU Member States
- Joint initiative
 - European Society of Clinical Microbiology and Infectious Diseases (ESCMID)
 - Dutch National Institute of Public Health and the Environment (RIVM)
- Close collaboration with ECDC
 - Use methodology compatible to EARS-Net



Klebsiella pneumoniae: percentage of invasive isolates resistant to carbapenems; EU/EEA, 2014



Update with 2015 data:
18 Nov. 2016

ECDC risk assessment on the spread of carbapenemase-producing *Enterobacteriaceae*: risk factors for patient infection or colonisation

- **Prior use of antimicrobials**

- Any antimicrobial
- **Carbapenems** (associated with a high risk estimate)
- Other antimicrobials (fluoroquinolones, cephalosporins, anti-pseudomonal penicillins, metronidazole)

- **Cross-border transfer of patients**

Strong evidence that it is associated with risk for transmission when:

- Patients are transferred from countries with high rates of CPE to healthcare facilities in other countries
- Patients had received medical care abroad in areas with high rates of CPE

- **Transfer of patients within units of same hospital**

- Immunosuppression, severity of illness, invasive procedures

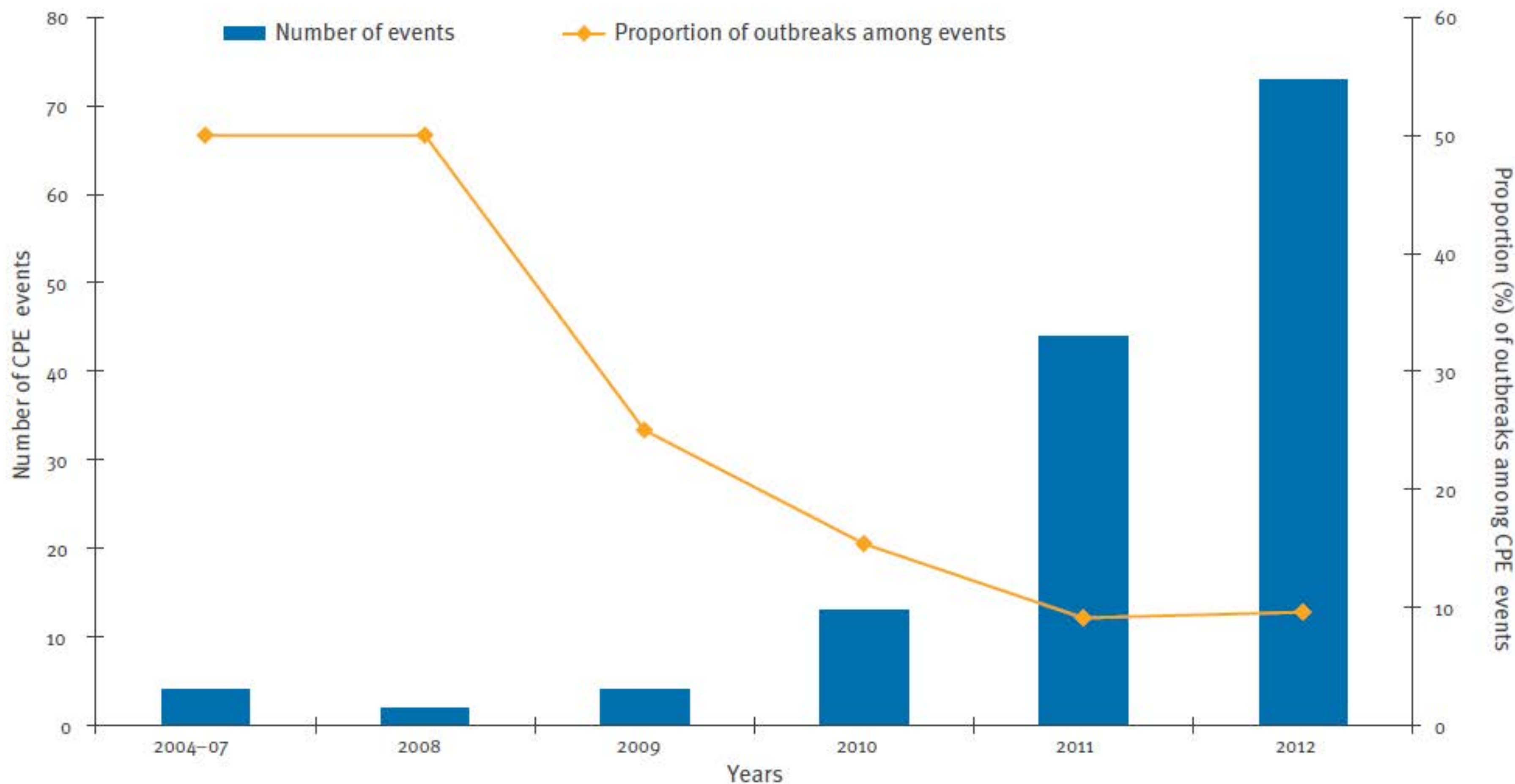
Infection control measures to prevent the spread of carbapenemase-producing *Enterobacteriaceae* (CPE) through cross-border transfer of patients



Scientific evidence for the effectiveness of:

- Hand hygiene, patient isolation, patient cohorting, nursing (or staff) cohorting (similar to dedicated nursing), environmental cleaning, staff education, case notification/flagging, contact tracing and antibiotic restriction
- Early implementation of active surveillance by rectal screening for CPE carriage upon admission to hospital, or specific wards/units, or during outbreaks
- Pre-emptive isolation on admission, dedicated nursing or other types of dedicated care by staff members, contact precautions (gloves and gowns)

Carbapenemase-producing *Enterobacteriaceae*: long-term control of hospital outbreaks in Paris, France, 2004-2012



A CPE event was defined as one index case (respectively defined as infected or colonised with CPE), followed or not by secondary case(s).

Spread of carbapenemase-producing *Enterobacteriaceae* (CPE) in the EU/EEA: assessment by national experts

No case reported

Sporadic occurrence

Single hospital outbreaks

Sporadic hospital outbreaks

Regional spread

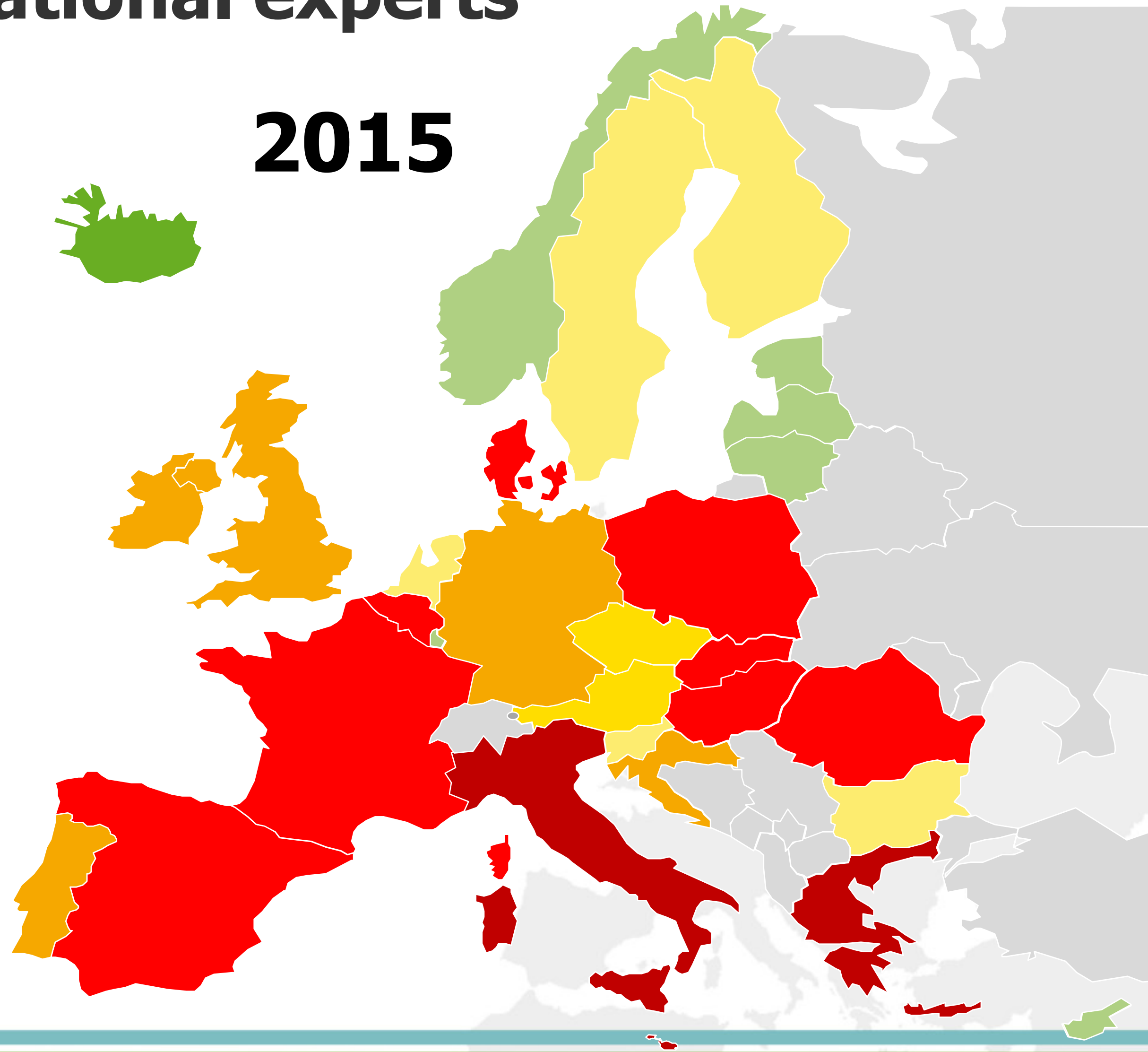
Interregional spread

Endemic situation

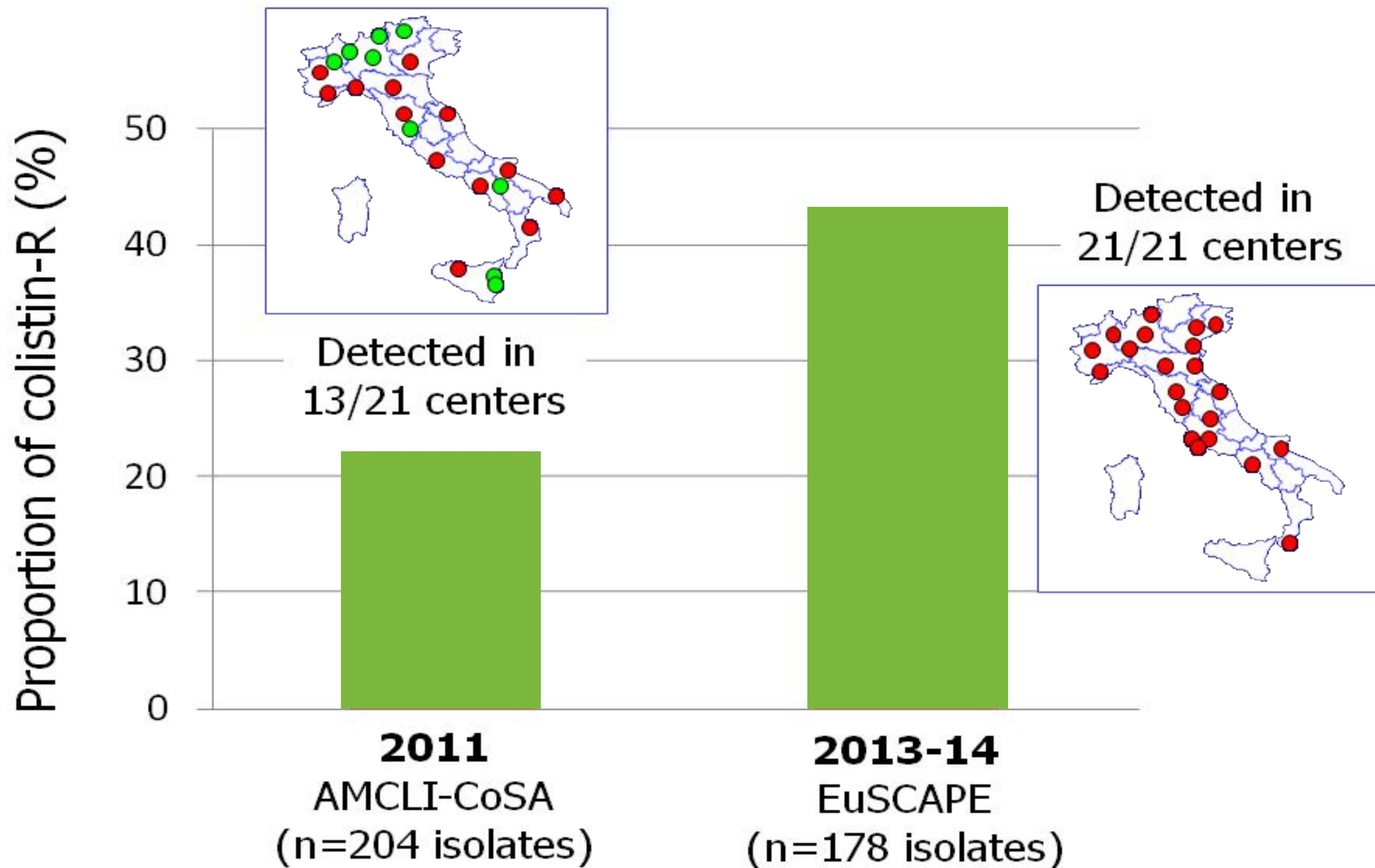
Not participating
or not reporting

Non-EU/EEA
countries

2015



Colistin-resistant carbapenemase (KPC)-producing *K. pneumoniae* from two nationwide surveys, Italy, 2011 & 2013-2014

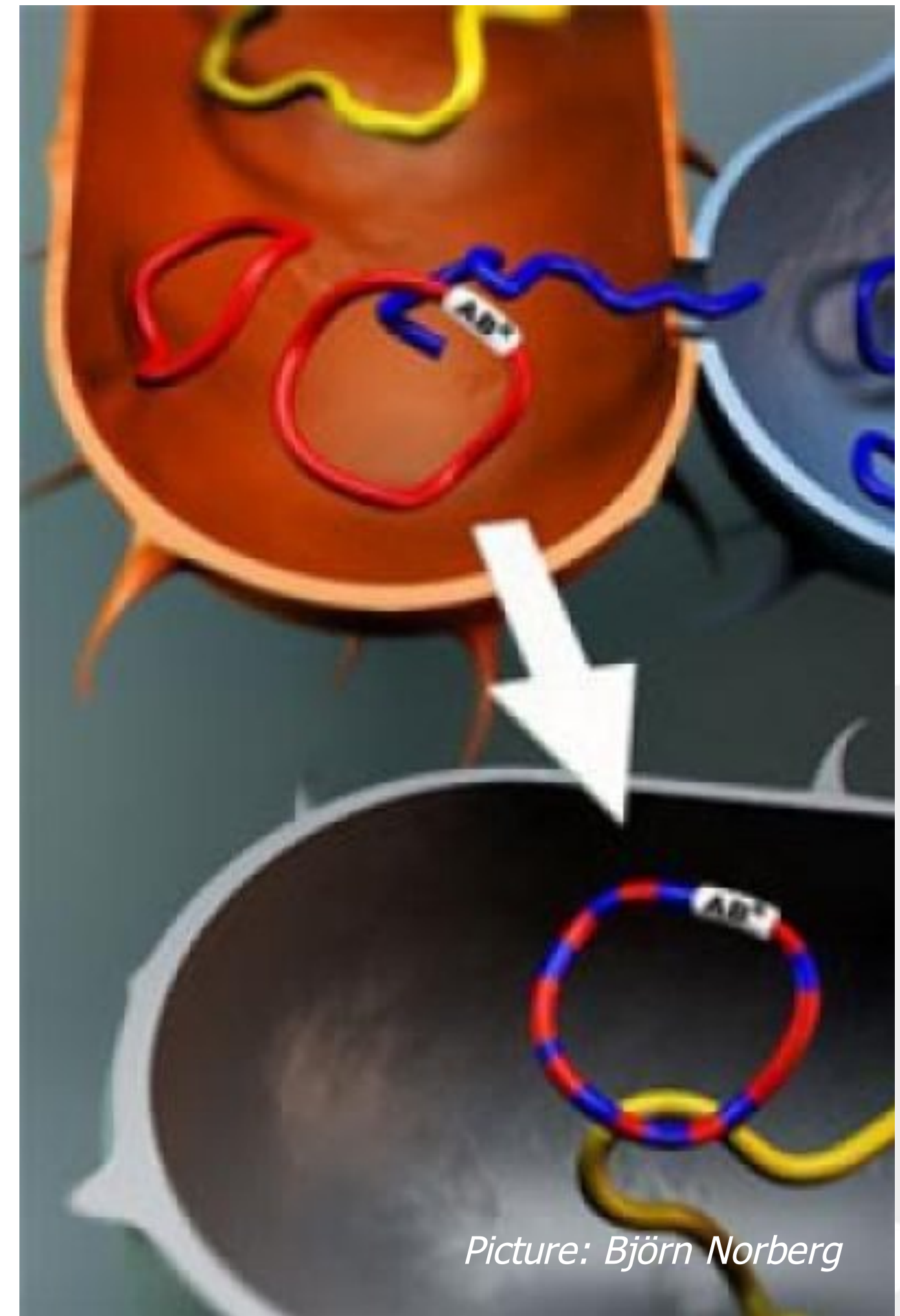


Reporting of *mcr-1* gene (colistin resistance) in samples from animal, food, environmental and human origin (as of 13 June 2016)



Plasmid-mediated carbapenem resistance and colistin resistance: examples

- **2013**, Canada: patient with previous healthcare in Egypt and duodenal and sigmoid perforation, and *E. coli* with both ***bla*_{OXA-48}** and ***mcr-1***
- **2014**, Germany: patient with a foot wound infection with *E. coli* harbouring ***bla*_{KPC-2}** and ***mcr-1***
- **2014**, Italy: rectal swab of leukemic child with *K. pneumoniae* ST512 with ***bla*_{KPC-3}** and ***mcr-1***
- **2015, China**: China: two patients (surgical wound, peritoneal fluid) with *K. pneumoniae* with ***bla*_{NDM-5}** and ***mcr-1***



Picture: Björn Norberg

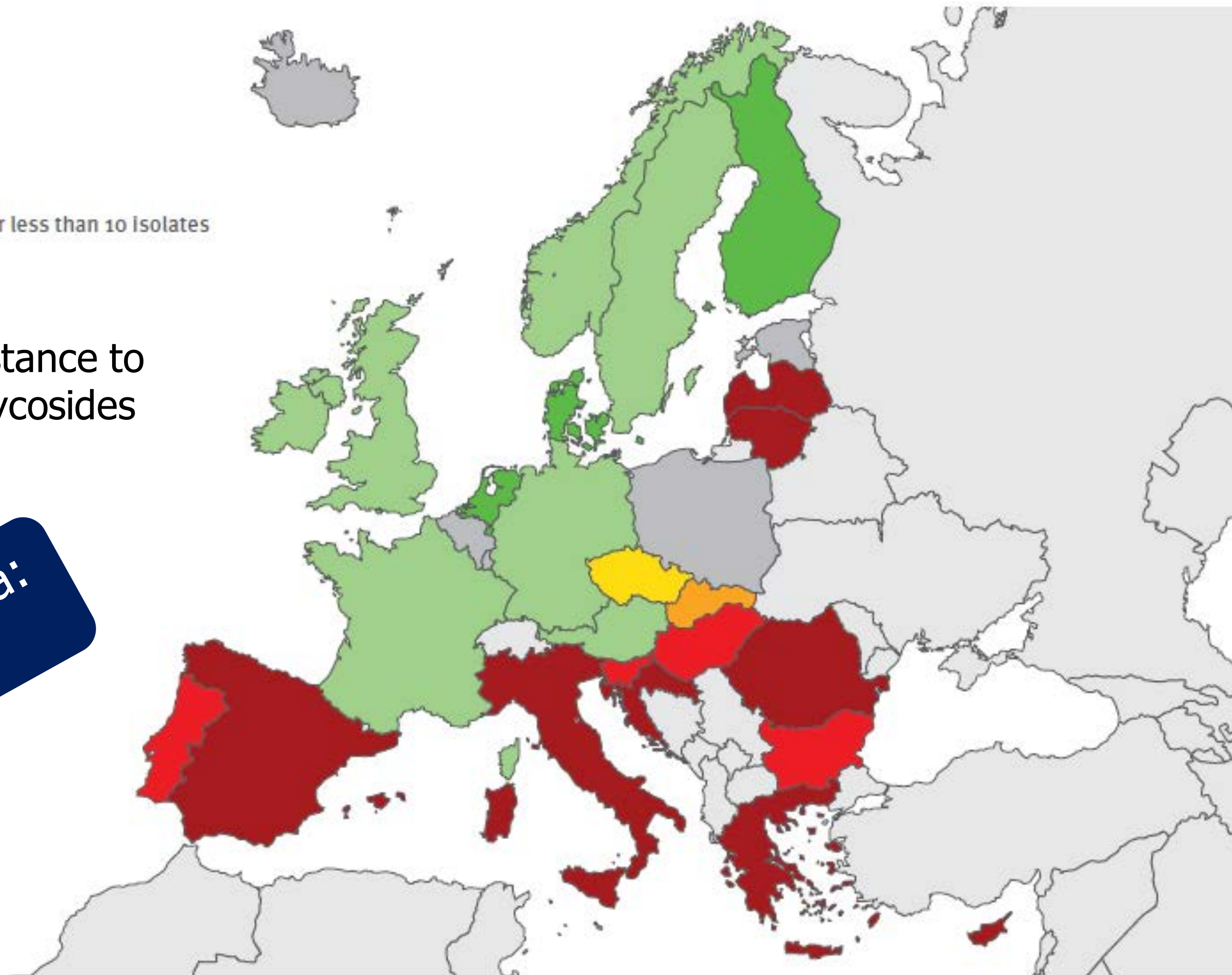
***Acinetobacter* spp.: percentage of invasive isolates with combined resistance*; EU/EEA, 2014**



*Combined resistance: resistance to
fluoroquinolones, aminoglycosides
and carbapenems

Update with 2015 data:
18 Nov. 2016

Non-visible countries
Liechtenstein
Luxembourg
Malta



ECDC rapid risk assessments



RAPID RISK ASSESSMENT

Carbapenem-resistant Enterobacteriaceae

8 April 2016

Main conclusions and options for response

Carbapenem-resistant Enterobacteriaceae (CRE) pose a significant threat to patients and healthcare systems in all EU/EEA Member States. CRE infections are associated with high mortality, primarily due to delays in administration of effective treatment and the limited availability of effective treatment options. New antibiotics capable of replacing carbapenems for their main indications are not likely to become available in the near future. CRE are adapted to spread in healthcare settings as well as in the community, and measures should address both routes of transmission.

Options for actions to reduce identified risks

1. Actions related to limited treatment options and high mortality

Timely and appropriate laboratory investigation and reporting is essential to avoid a delay in appropriate treatment, which is associated with increased morbidity and mortality. Patients with CRE infections are likely to benefit from consultations with experts in infectious diseases or clinical microbiology, which would ensure the best possible outcome considering the limited treatment options.

2. Actions to prevent transmission of CRE in hospitals and other healthcare settings

Good standard infection control, including environmental cleaning and adequate reprocessing of medical devices, and adequate capacity of microbiological laboratories are the basis for prevention of transmission of multidrug-resistant bacteria such as CRE. Prompt notification of the clinical team and of the infection prevention and control/hospital hygiene team is essential.

Targeting patients at high risk for carriage of CRE

Patients who had recently been hospitalised in a country or region known as having a high CRE prevalence – or who were transferred from an individual hospital with a high CRE prevalence – should be considered at high risk of digestive tract carriage of CRE. Screening these patients for digestive tract carriage of CRE and implementing pre-emptive contact precautions and pre-emptive isolation should be considered. Hospitals could also consider pre-emptive isolation and screening for CRE carriage in accordance with national guidance for patients who recently travelled to countries/regions known for their high CRE prevalence, even if they were not in contact with a healthcare institution/service.

Suggested citation: European Centre for Disease Prevention and Control. Rapid risk assessment: Carbapenem-resistant Enterobacteriaceae – 8 April 2016. Stockholm: ECDC; 2016.

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RAPID RISK ASSESSMENT

Plasmid-mediated colistin resistance in Enterobacteriaceae

13 June 2016

Conclusions and options for response

The recently recognised global distribution of a self-transferable plasmid-borne colistin resistance determinant (*mcr-1* gene) poses a substantial public health risk to the EU/EEA. This specific mode of molecular dissemination of drug resistance is an example of a so-called plasmid-mediated gene epidemic.

This plasmid-mediated gene epidemic is of exceptional public health concern because it further limits treatment options in patients with infections caused by multidrug-resistant (MDR) gram-negative bacteria and can spread colistin resistance more easily between bacteria and humans than colistin resistance resulting from chromosomal mutation. MDR gram-negative bacteria, including carbapenem-resistant Enterobacteriaceae strains that acquire the *mcr-1* gene, remain susceptible to only a few antimicrobial agents, which means that infections caused by these strains are very difficult to treat and result in excess mortality. As the limited development of new antimicrobials is unlikely to provide a solution anytime soon, it is crucial to take measures to control the spread of *mcr-1* and thus protect the activity of colistin.

Options for actions to reduce identified risks

Improved laboratory methods for colistin resistance and *mcr-1* detection

The European Committee on Antimicrobial Susceptibility Testing (EUCAST) and the Clinical Laboratories Standards Institute (CLSI) recommend MIC determination by microbroth dilution as the reference method for colistin susceptibility testing. For the time being, these organisations do not recommend other methods (e.g. agar dilution, disk diffusion or gradient diffusion) for colistin susceptibility testing until historical data have been reviewed or new study data have been generated. ECDC has added colistin to the priority panel of antimicrobial agents to test for as part of the EU surveillance of antimicrobial-resistant *Salmonella* infections (revised EU surveillance protocol to be published June 2016) and initiated a project with EUCAST to study the gradient strip MIC and disk diffusion methods as an alternative.

PCR for *mcr-1* detection could be conveniently combined with the detection of other resistance gene targets in multiplex PCR-based assays used for the detection of multi-drug resistance determinants of epidemiological and clinical importance in gram-negative bacilli, such as extended-spectrum beta-lactamases and carbapenemases. Whole-genome sequencing (WGS) can be used for the detection or confirmation of the presence of the *mcr-1* gene and offers additional information about the associated plasmid vector, additional resistance genes, and strain type.

Suggested citation: European Centre for Disease Prevention and Control. Plasmid-mediated colistin resistance in Enterobacteriaceae. Stockholm: ECDC; 2016.

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Definitions for multidrug-resistant (MDR), extensively drug-resistant (XDR) and pandrug-resistant (PDR) bacteria: international expert proposal

ORIGINAL ARTICLE

10.1111/j.1469-0691.2011.03270.x

Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance

A.-P. Magiorakos¹, A. Srinivasan², R. B. Carey³, Y. Carmeli⁴, M. E. Falagas^{4,5}, C. G. Giske⁶, S. Harbarth⁷, J. F. Hindler⁸, G. Kahlmeter⁹, S. Olsson-Ujéquist¹⁰, D. L. Paterson¹¹, L. B. Rice¹², J. Stelling¹³, M. J. Struelens¹⁴, A. Vachon¹⁵, J. T. Weber¹⁶ and D. L. Monnet¹⁷

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Abstract

Many different definitions for multidrug-resistant (MDR), extensively drug-resistant (XDR) and pandrug-resistant (PDR) bacteria are being used in the medical literature to characterize the different patterns of resistance found in healthcare-associated, antimicrobial-resistant bacteria. A group of international experts came together through a joint initiative by the European Centre for Disease Prevention and Control (ECDC) and the Centers for Disease Control and Prevention (CDC), to create a standardized international terminology with which to describe acquired resistance profiles in *Staphylococcus aureus*, *Enterococcus* spp., *Enterobacteriaceae* (other than *Salmonella* and *Shigella*), *Pseudomonas aeruginosa* and *Acinetobacter* spp., all bacteria often responsible for healthcare-associated infections and prone to multidrug resistance. Epidemiologically significant antimicrobial categories were constructed for each bacterium. Lists of antimicrobial categories proposed for antimicrobial susceptibility testing were created using documents and breakpoints from the Clinical Laboratory Standards Institute (CLSI), the European Committee on Antimicrobial Susceptibility Testing (EUCAST) and the United States Food and Drug Administration (FDA). MDR was defined as acquired non-susceptibility to at least one agent in three or more antimicrobial categories; XDR was defined as non-susceptibility to at least one agent in all but two or fewer antimicrobial categories (i.e. bacterial isolates remain susceptible to only one or two categories) and PDR was defined as non-susceptibility to all agents in all antimicrobial categories. To ensure correct application of these definitions, bacterial isolates should be tested against all or nearly all of the antimicrobial agents within the antimicrobial categories and selective reporting and suppression of results should be avoided.

Keywords: Antimicrobial agents; definitions; extensively drug resistant; multidrug resistant; pandrug resistant

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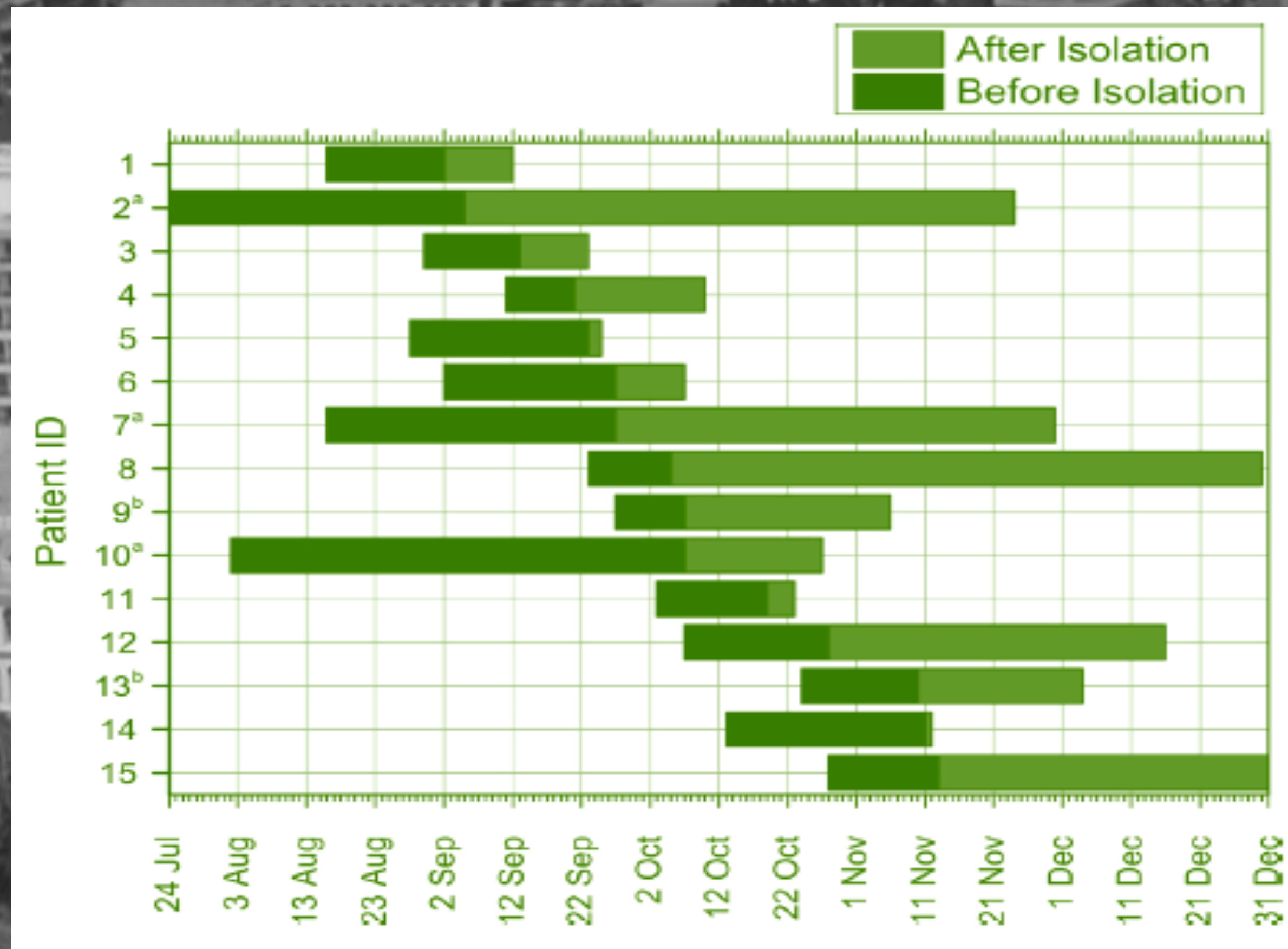
Isolate no.	Antimicrobial category								
	A	B	C	D	G	H	I	J	
1	■	■							Not MDR
2	■	■							Not MDR
3	■	■	■						MDR
4	■	■	■						MDR
5	■	■	■	■					MDR
6	■	■	■	■					MDR
7	■	■	■		NT	NT	NT	NT	MDR, possible XDR
8	■	■	■			NT	NT	NT	MDR, possible XDR
9	■	■			NT	NT	NT	NT	MDR, possible XDR, possible PDR
10	■	■				NT	NT	NT	MDR, possible XDR, possible PDR
11	■	■	■	■	■				XDR
12	■	■	■	■	■				XDR
13	■	■	■	■	■				XDR
14	■	■	■	■	■	■			XDR
15	■	■	■	■	■	■	■		XDR
16	■	■	■	■	■	■	■	■	XDR
17	■	■	■	■	■	■	■	■	XDR
18	■	■	■	■	■		NT	NT	XDR
19	■	■	■	■	■			NT	XDR
20							NT	NT	XDR, possible PDR
21								NT	XDR, possible PDR
22									PDR

Pandrug-resistant infections: an hypothetical challenge for Europe?



Ampicillin.....	R
Piperacillin/tazobaktam.	R
Cefadroxil.....	R
Imipenem.....	R
Meropenem.....	R
Ertapenem.....	R
Aztreonam.....	R
Colistin.....	R
Kloramfenikol.....	R
Tobramycin.....	R
Amikacin.....	R
Netilmicin.....	R
Trimetoprim.....	R
Trimetoprim-sulfa.....	R
Nitrofurantoin.....	R
Cefotaxim.....	R
Ceftazidim.....	R
Gentamicin.....	R
Ciprofloxacin.....	R

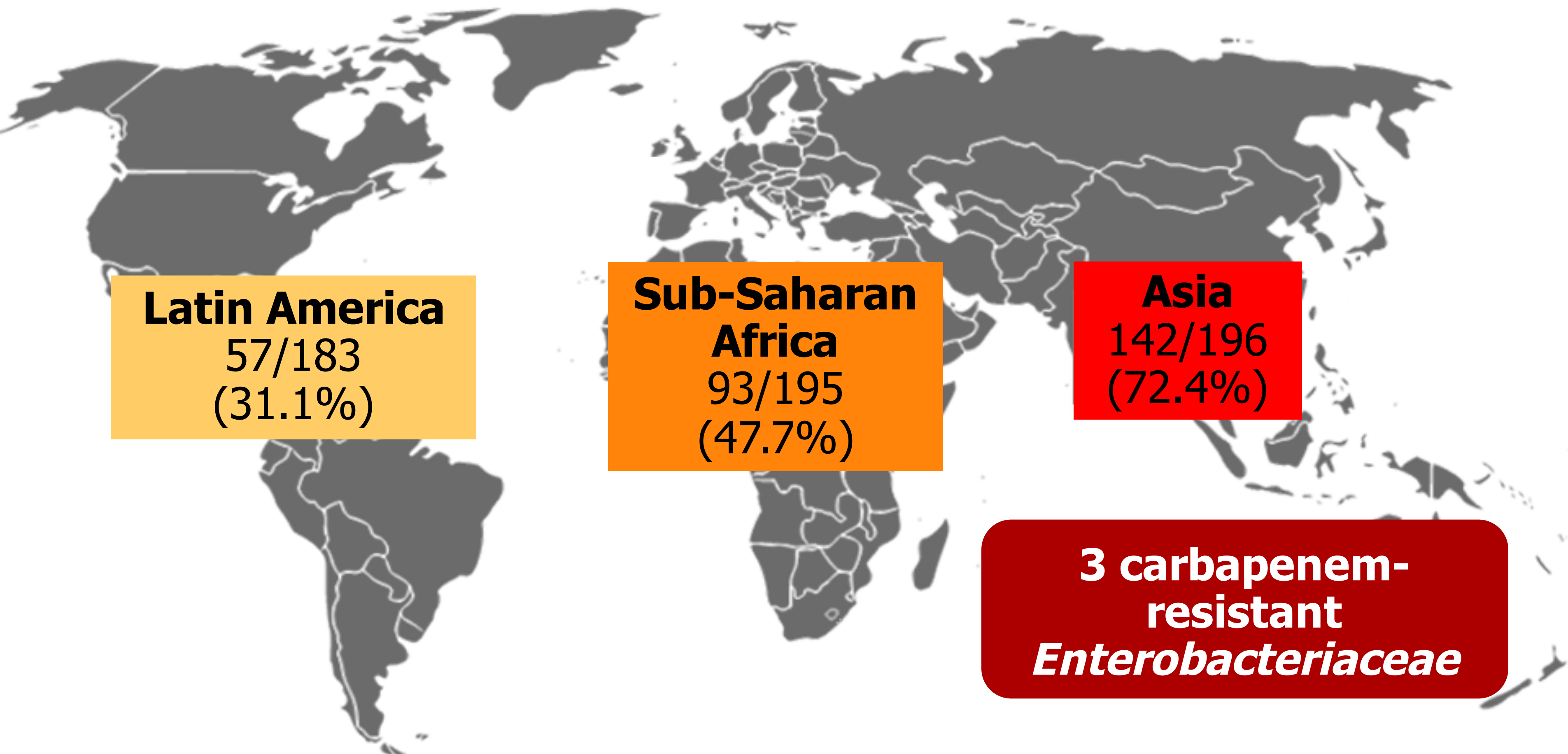
Outbreak of pandrug-resistant VIM-1 *Providencia stuartii*, Sept.-Nov. 2011



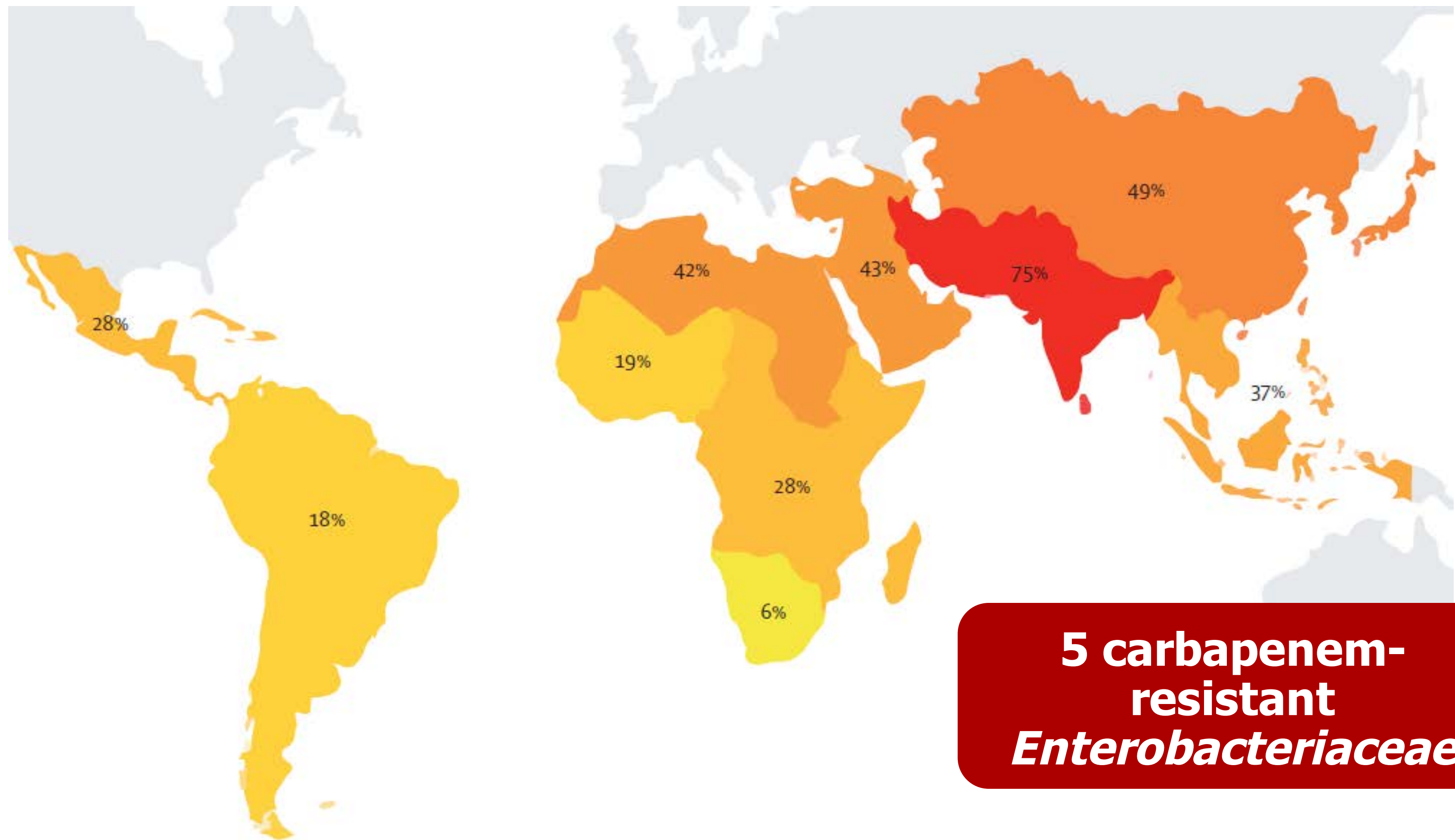
International travel... ...antimicrobial resistance

Date	Departure	Destination
Today	14:10	MULTIDRUG-RESISTANT MICROORGANISMS
Today	14:35	MULTIDRUG-RESISTANT MICROORGANISMS
Today	14:40	MULTIDRUG-RESISTANT MICROORGANISMS
Today	14:45	MULTIDRUG-RESISTANT MICROORGANISMS
Today	14:55	Baxjö
Today	15:00	Holmen
Today	15:00	MULTIDRUG-RESISTANT MICROORGANISMS
Today	15:00	MULTIDRUG-RESISTANT MICROORGANISMS
Today	15:05	MULTIDRUG-RESISTANT MICROORGANISMS
Today	15:05	MULTIDRUG-RESISTANT MICROORGANISMS
Today	15:10	Wasserdam
Today	15:15	MULTIDRUG-RESISTANT MICROORGANISMS
Today	15:15	Mørup

Frequency of fecal carriage of multidrug-resistant *Enterobacteriaceae* in international travellers, February 2012-April 2013



Percentage of international travellers that acquired β -lactamase-producing Enterobacteriaceae, 2012-2013



**5 carbapenem-
resistant
*Enterobacteriaceae***

Looking ahead

- **2016**
 - AMR data in ECDC ATLAS
 - RRA on *Acinetobacter* spp.
- **2017**
 - 2nd JIACRA report
 - Burden of AMR for EU/EEA
 - ECDC Expert Opinion on AMR risks linked to travel
 - LA-MRSA inf. in humans
- **2018**
 - Results of ECDC point prevalence surveys of HAIs
- **2019**
 - Comprehensive ECDC report on AMR in Europe



European Centre for Disease Prevention and Control

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Antimicrobial consumption

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Antimicrobial Resistance and Healthcare-associated Infections Programme

Factsheet for health professionals

Factsheet for the general public

Directory: Guidance on prevention and control



Antimicrobial resistance and antimicrobial consumption



Antimicrobial resistance



Antimicrobial consumption



European Antibiotic Awareness Day



Antibiotics are one of the most important therapeutic discoveries in medical history. They have revolutionised the way we treat patients with bacterial infections and have contributed to reducing the mortality and morbidity from bacterial diseases. They are also an essential tool for modern medicine and common procedures such as transplantation, chemotherapy for cancer and even orthopaedic surgery could not be performed without the availability of potent antibiotics.

Unfortunately, antibiotics have been liable to misuse. They are often unnecessarily prescribed for viral infections, against which they have no effect. Similarly when diagnoses are not accurately made, more often than not, broad-spectrum antibiotics, i.e. antibiotics that kill a large proportion of various bacteria and not only the bacteria responsible for the disease, are prescribed because the causative micro-organism is not known.

WORLD ANTIBIOTIC AWARENESS WEEK

14-20 NOVEMBER 2016

ANTIBIOTICS
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Thank you!



**World Health
Organization**

EUROPEAN ANTIBIOTIC AWARENESS DAY



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18 November 2016



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