Antimicrobial resistance trends in Europe

Dominique L. Monnet, for the Antimicrobial Resistance & Healthcare-Associated Infections (ARHAI) Disease Programme

Rome, 22 December 2014

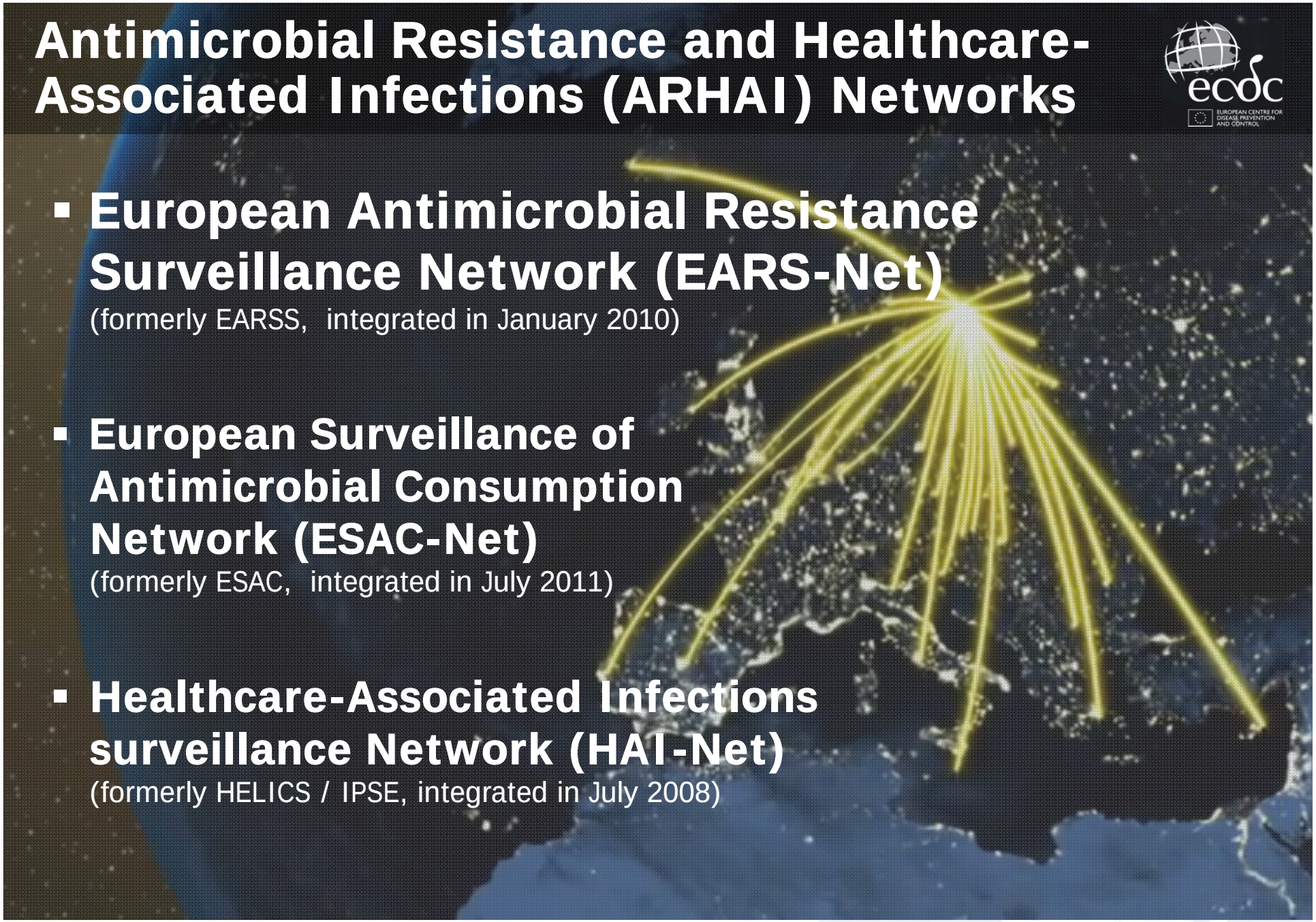
What is the role of ECDC in its Founding Regulation?

... to identify, assess and communicate current and emerging health threats to human health from communicable diseases.

— ECDC Founding Regulation (851/2004), Article 3

- EU-level disease surveillance and epidemic intelligence
- Scientific opinions and studies
- Early Warning System and response
- Technical assistance and training
- Communication to scientific community
- Communication to the public

Antimicrobial Resistance and Healthcare-Associated Infections (ARHAI) Networks



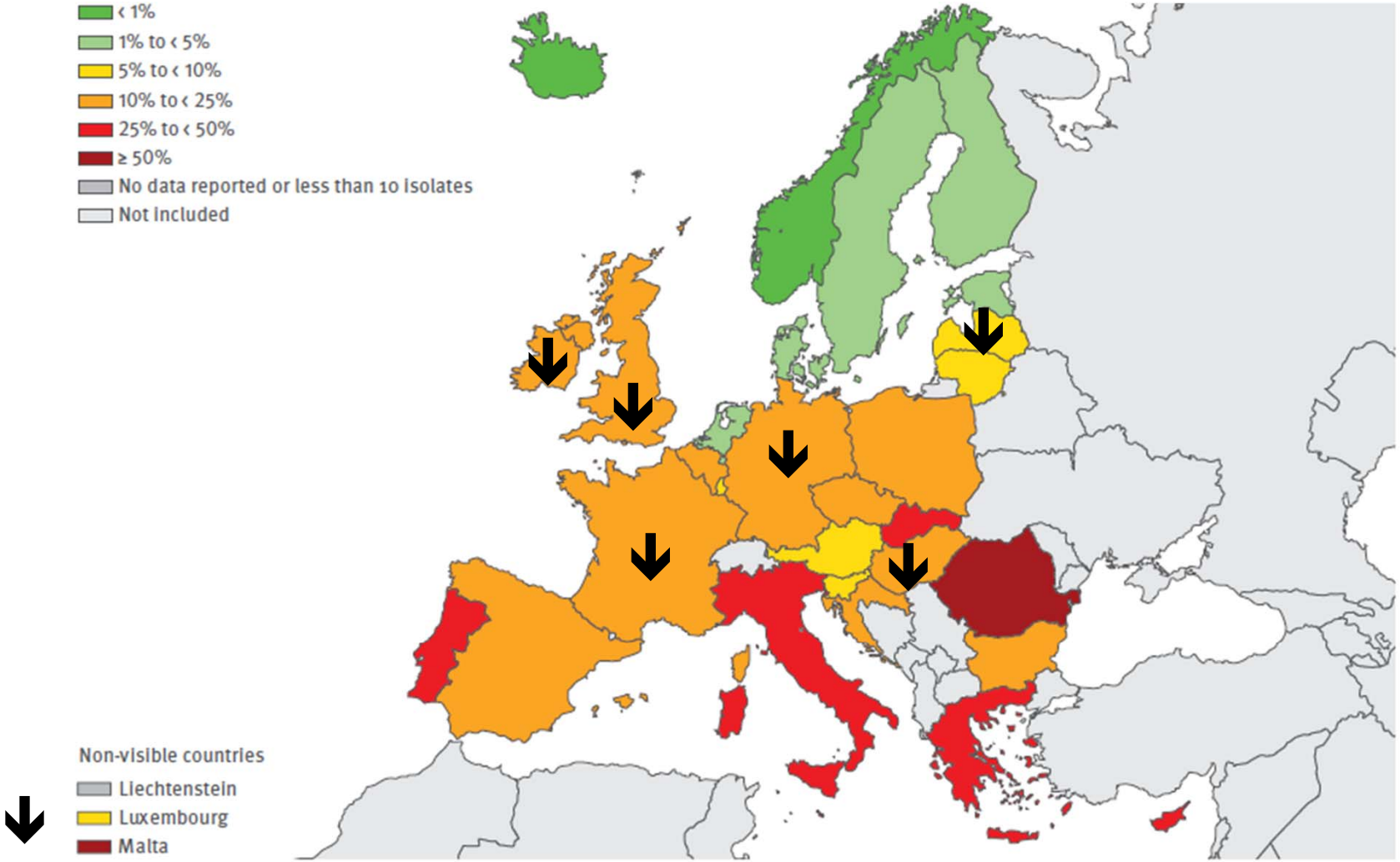
- **European Antimicrobial Resistance Surveillance Network (EARS-Net)**
  (formerly EARSS, integrated in January 2010)

- **European Surveillance of Antimicrobial Consumption Network (ESAC-Net)**
  (formerly ESAC, integrated in July 2011)

- **Healthcare-Associated Infections surveillance Network (HAI-Net)**
  (formerly HELICS / IPSE, integrated in July 2008)

http://www.ecdc.europa.eu/en/activities/diseaseprogrammes/ARHAI/Pages/surveillance_networks.aspx

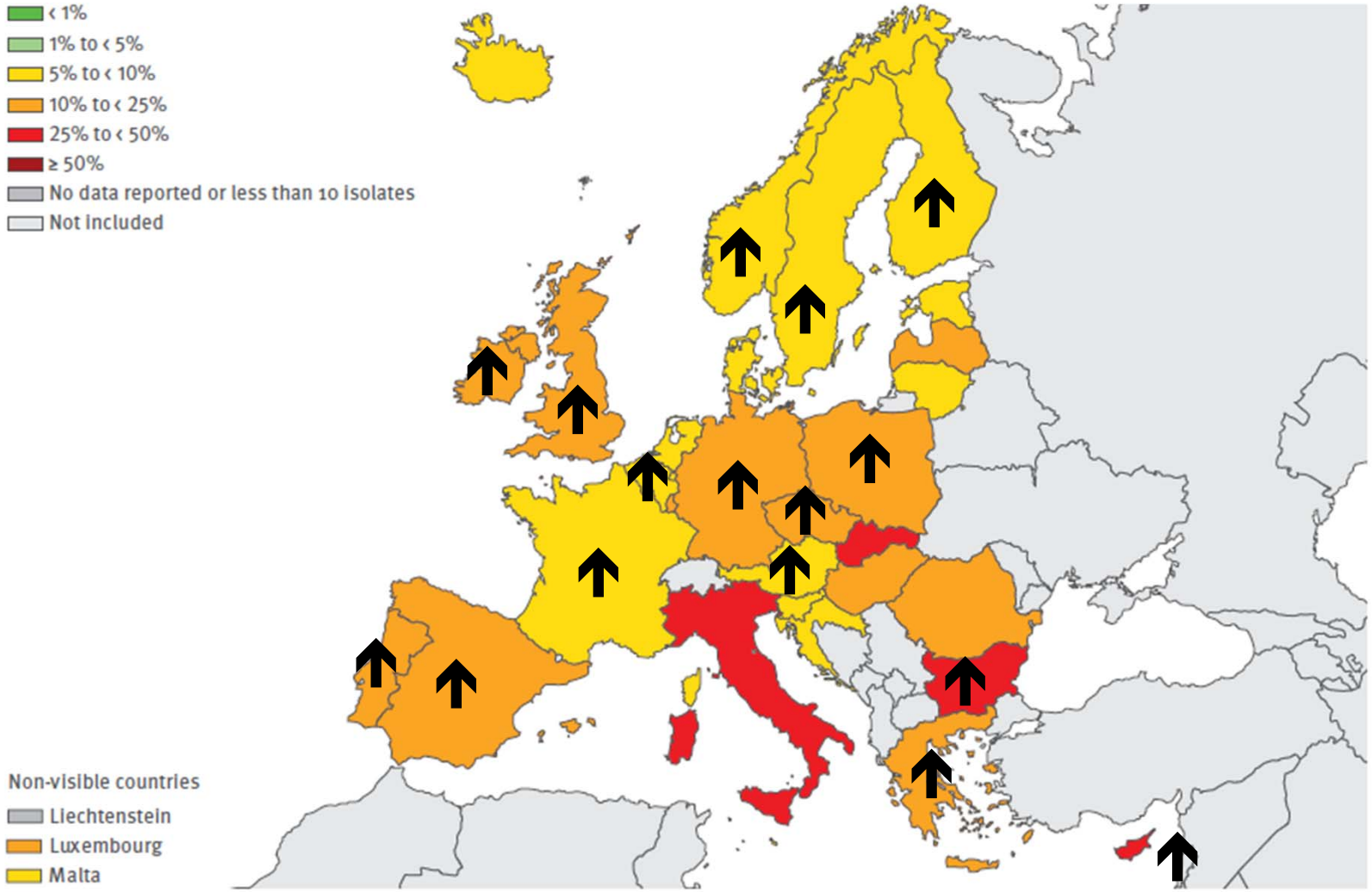
Staphylococcus aureus: percentage of invasive isolates resistant to meticillin (MRSA); EU/EEA, 2013



Source: EARS-Net, 2014

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2010-2013, respectively. These trends were calculated on laboratories that consistently reported during this period.

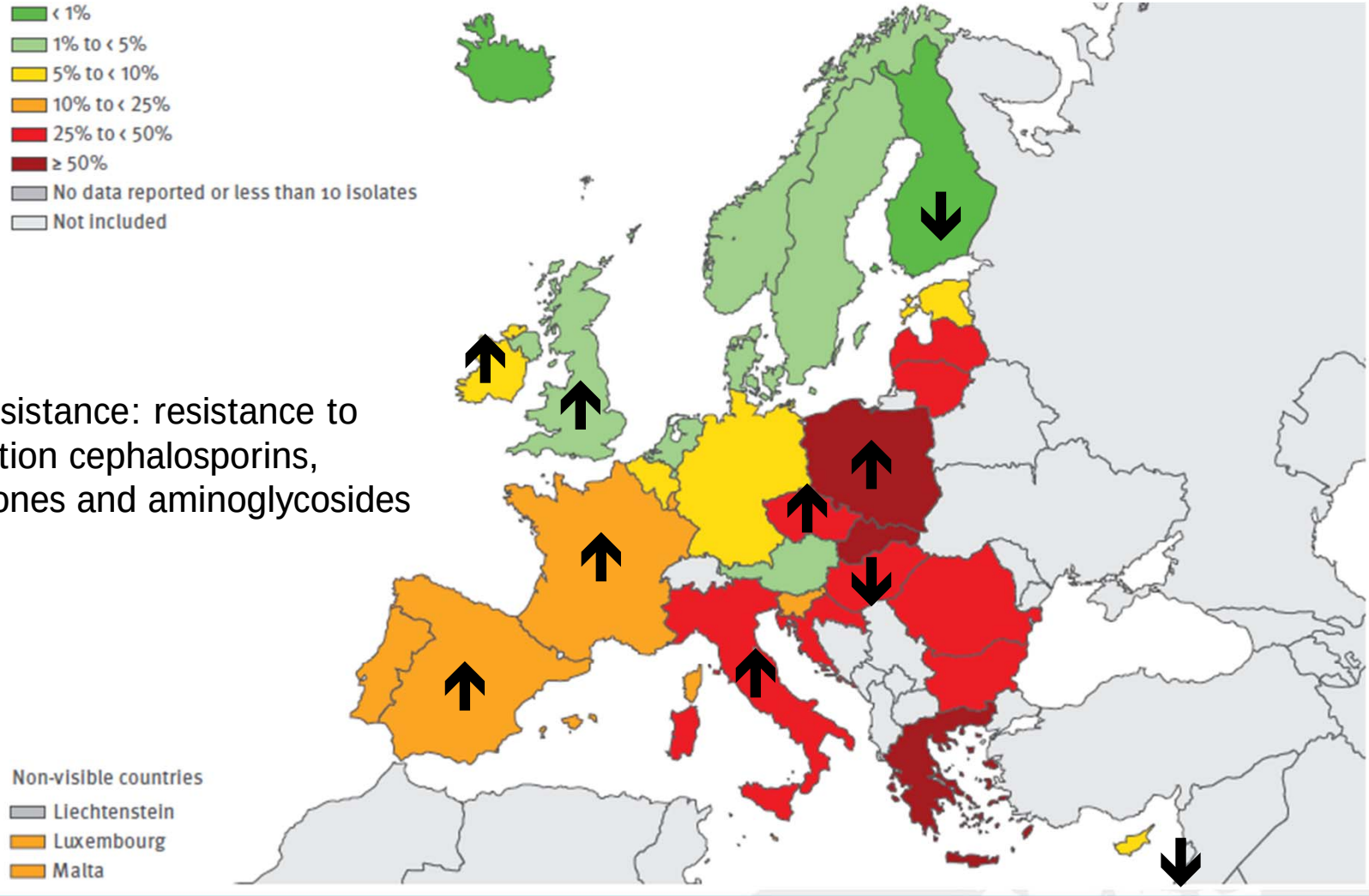
Escherichia coli: percentage of invasive isolates resistant to third-generation cephalosporins; EU/EEA, 2013



Source: EARS-Net, 2014

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2010-2013, respectively. These trends were calculated on laboratories that consistently reported during this period.

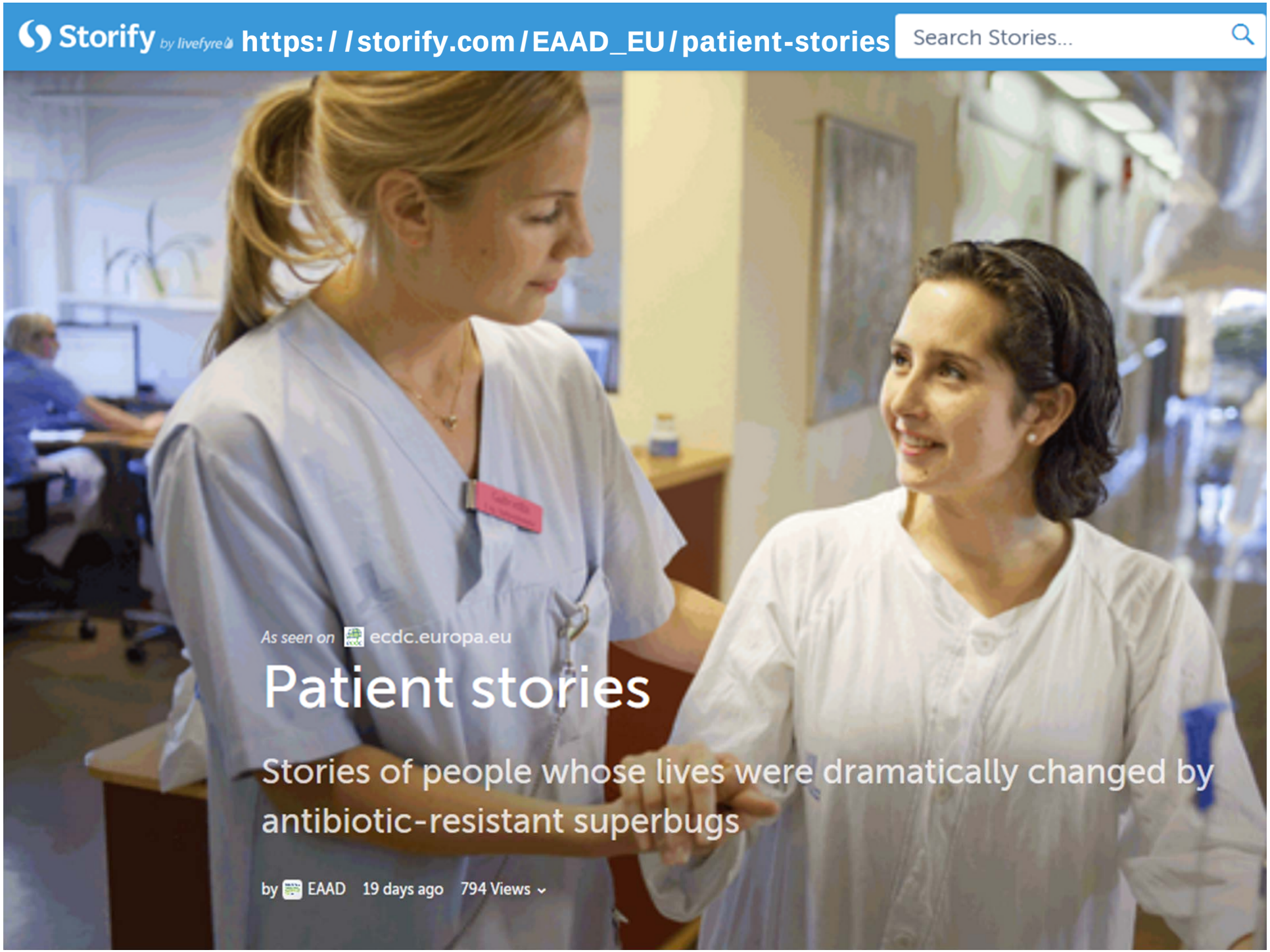
Klebsiella pneumoniae: percentage of invasive isolates with combined resistance*; EU/EEA, 2013



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

Source: EARS-Net, 2014

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2010-2013, respectively. These trends were calculated on laboratories that consistently reported during this period.


Storify by livefyre
https://storify.com/EAAD_EU/patient-stories
Search Stories...
As seen on ecdc.europa.eu
Patient stories
Stories of people whose lives were dramatically changed by antibiotic-resistant superbugs
by EAAD 19 days ago 794 Views


Mohammed
(United Kingdom)
https://storify.com/EAAD_EU/patient-stories

Carbapenem-resistant infections: a challenge for appropriate patient therapy

1. Klebsiella pneumoniae ESBL-CARBA > E5 CFU/mL

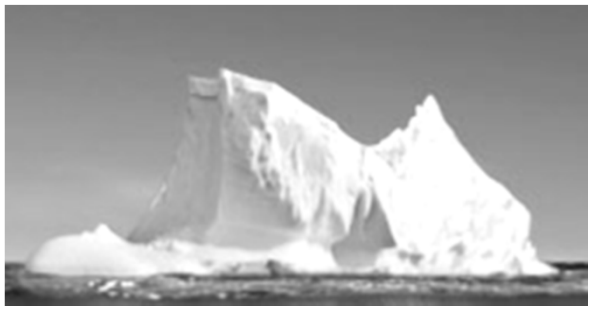
MIC: Aztreonam = 0.25 mg/L = S
MIC: Colistin = 0.12 mg/L = S
MIC: Kloramfenikol = 256 mg/L = R
MIC: Tobramycin = <256 mg/L = R
MIC: Amikacin = <256 mg/L = R
MIC: Netilmicin = <256 mg/L = R
MIC: Nitrofurantoin = 512 mg/L = R
MIC: Gentamicin = <256 mg/L = R
Obs! Stammen bildar ESBL-CARBA (ICD-10 kod U82.2). Klinisk anmälningsplikt och smittspårningsplikt enl smittskyddslagen. Kontakta alltid vårdhygien. För mer information: www.smittskyddstockholm.se

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

Sammanfattning/Övrigt:

Obs! Mycket omfattande resistensprofil. Endast känslig för colistin.

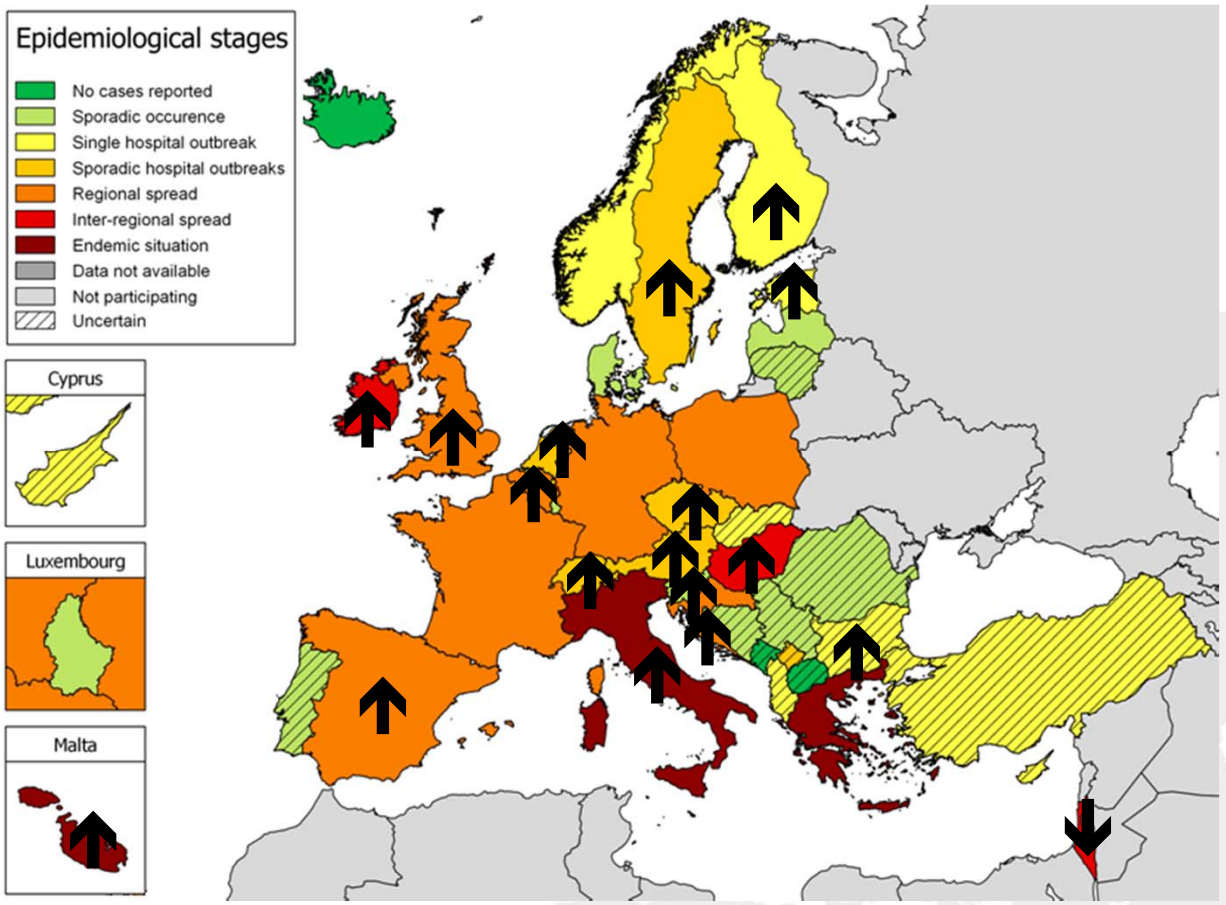
Klebsiella pneumoniae: percentage of invasive isolates resistant to carbapenems; EU/EEA, 2013



Source: EARS-Net, 2014

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2010-2013, respectively. These trends were calculated on laboratories that consistently reported during this period.

Country self-assessment of stages for spread of carbapenemase-producing *Enterobacteriaceae* (all isolates), 2010 and 2013



Source: Grundmann et al. Eurosurveill 2010, and EuSCAPE project, Glasner et al., Eurosurveill 2013.

The symbols ↑ and ↓ indicate a positive or negative change in stage between 2010 and 2013. This change could only be indicated for countries that reported for both years.

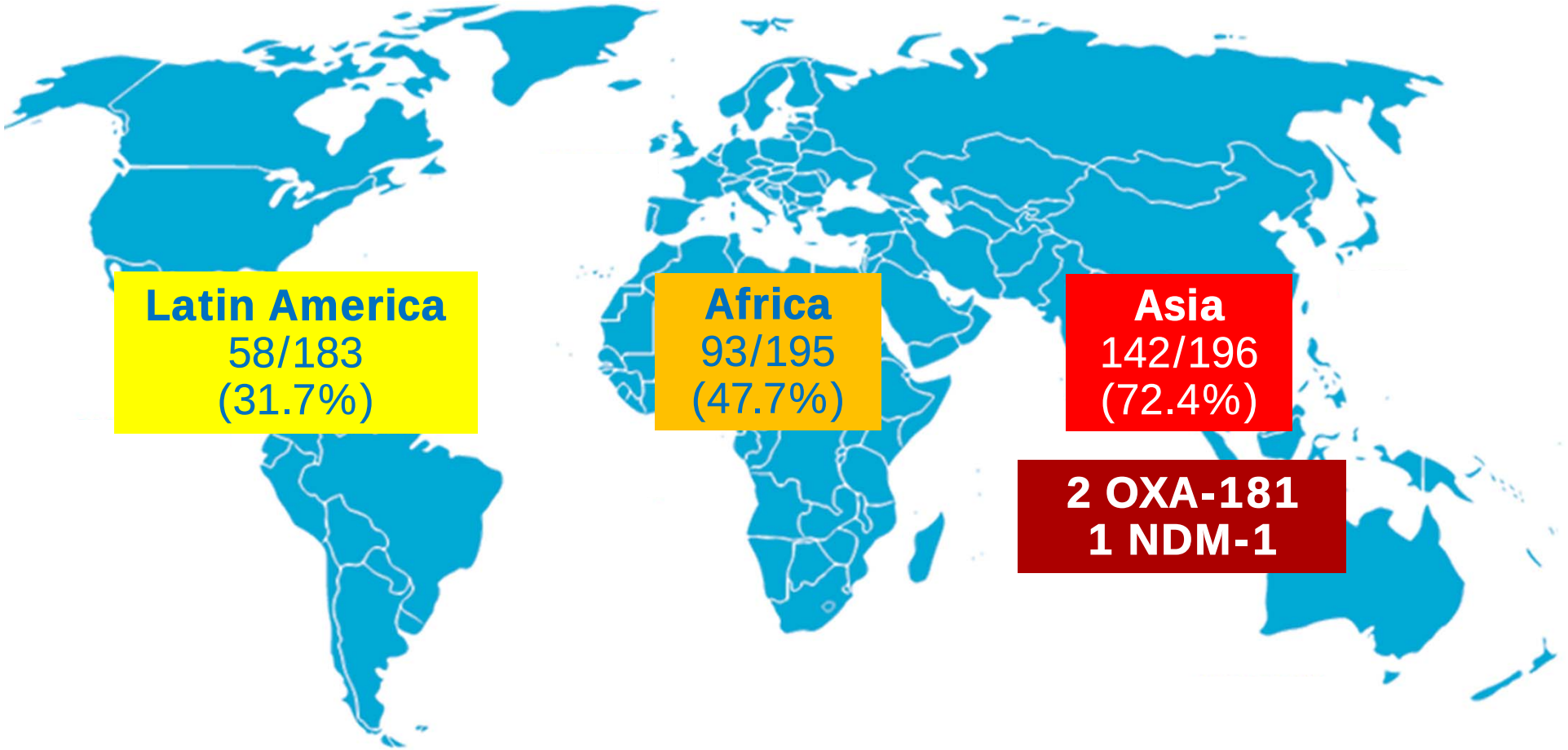
ECDC risk assessment on the spread of carbapenemase-producing *Enterobacteriaceae*: risk factors for patient infection or colonisation

- **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

Source: ECDC, 2011. http://ecdc.europa.eu/en/publications/Publications/110913_Risk_assessment_resistant_CPE.pdf

Carriage of multidrug-resistant *Enterobacteriaceae* in returning travellers, 2012-2013

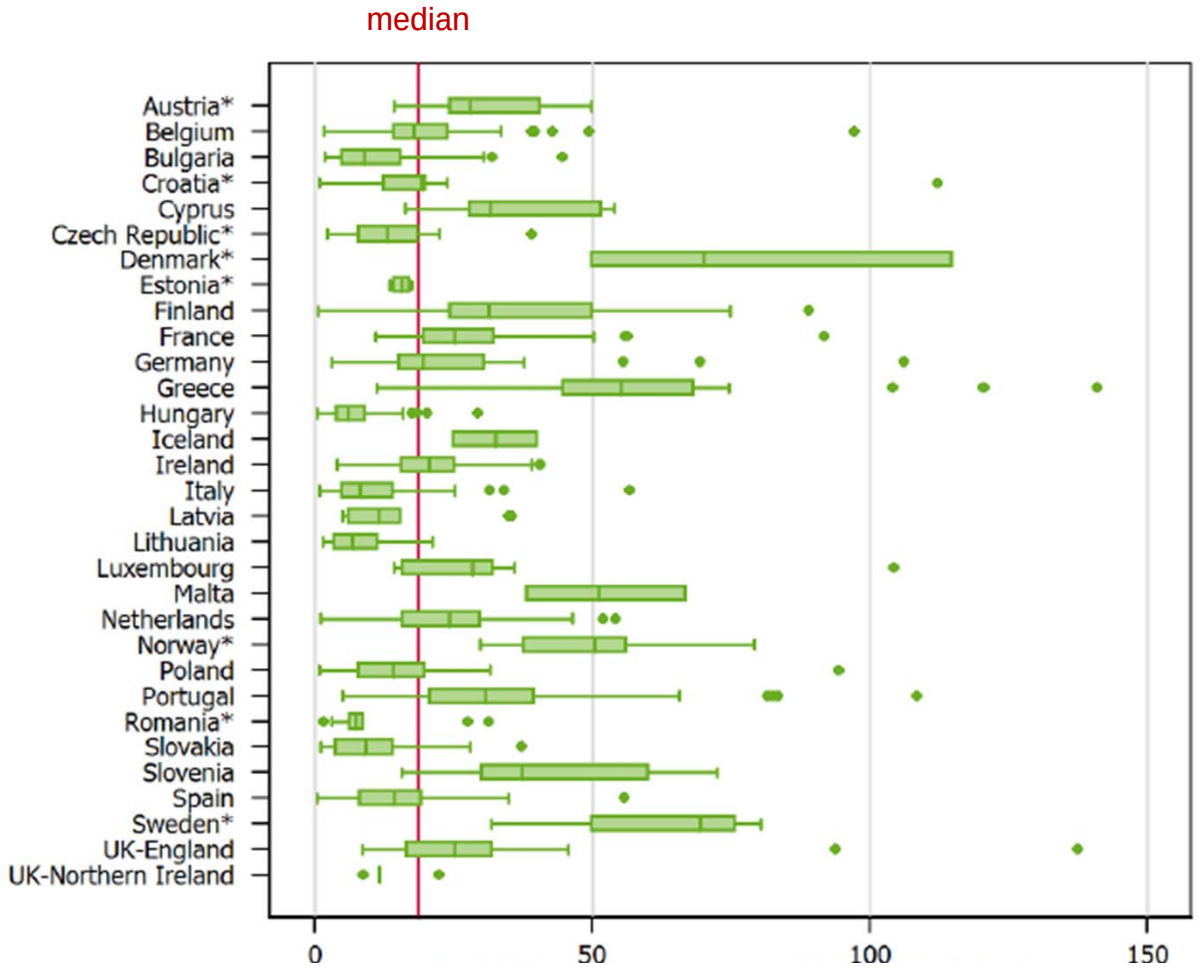


Source: VOYAG-R Study. Ruppé E, et al. 33rd RICAI, Paris, 27-28 November 2013 [abstr. 195].; Ruppé E, et al. Eurosurveillance 2014 Apr 10;19(14). pii: 20768.

Carbapenemase-producing *Enterobacteriaceae* (CPE): other issues

- **International travel**
  VOYAG-R Study. Ruppé E, et al. 33rd RICAI, Paris, 27-28 November 2013 [abstr. 195].; Ruppé E, et al. Eurosurveillance 2014 Apr 10;19(14). pii: 20768.
  COMBAT Study. Penders J, et al. 3rd Euregional Maastricht Symposium on Immune Compromised Traveller, Maastricht, 24 March 2014.
- **Travelling healthcare workers**
  suspected by Munier E, et al. Am J Infect Control 2014;42:85-6.
- **Refugees and war casualties (Libya)**
  Pirš M, et al. Euro Surveill. 2011 Dec 15;16(50):20042.
  Hammerum AM, et al. Int J Antimicrob Agents. 2012 Aug;40(2):191-2.
  Kocsis E, et al. Clin Microbiol Infect. 2013 Sep;19(9):E409-11.
- **Environment** (outside of hospitals)
  carbapenemase-producing *Serratia fonticola* from drinking water. Henriques I, et al. Genome Announc. 2013;1(6). pii: e00970-13.
- **Foodborne pathogens**
  carbapenemase-producing *Salmonella* Kentucky
  Le Hello et al. Lancet Infect Dis. 2013 Aug;13(8):672-9.
  Seiffert SN, et al. Antimicrob Agents Chemother. 2014 Jan 27.

ECDC PPS in European acute care hospitals, 2011-2012: example of indicator



Alcohol hand rub consumption (L / 1000 patient-days)

**PPS data representativeness was poor in Austria, Croatia, Czech Republic, Estonia, Norway and Romania and very poor in Denmark and Sweden. Red vertical line=median (18.7 litres/1000 patient-days).*

Source: HAI-Net, ECDC, 2013.
http://www.ecdc.europa.eu/en/publications/Publications/healthcare-associated-infections-antimicrobial-use-PPS.pdf

Trends in consumption of antibacterials for systemic use in the hospital sector (expressed in DDD per 1000 inhabitants and per day)**, EU/EEA, 2009-2013**

	2009	2010	2011	2012	2013	Trends in antimicrobial consumption, 2009–2013	Average annual change 2009–2013	Statistical significance
Total (J01)	2.1	2.0	2.0	2.0	2.0		-0.02	n. s.
Carbapenems (J01DH)	0.043	0.050	0.049	0.054	0.056		0.003	significant
Polymyxins (J01XB)	0.008	0.008	0.011	0.014	0.014		0.002	significant

Source: ESAC-Net, 2014. http://ecdc.europa.eu/en/eaad/Pages/antibiotics-data-reports.aspx

Extensively drug-resistant infections: an hypothetical challenge for Europe?

1. Klebsiella pneumoniae ESBL-CARBA > E5 CFU/mL

?

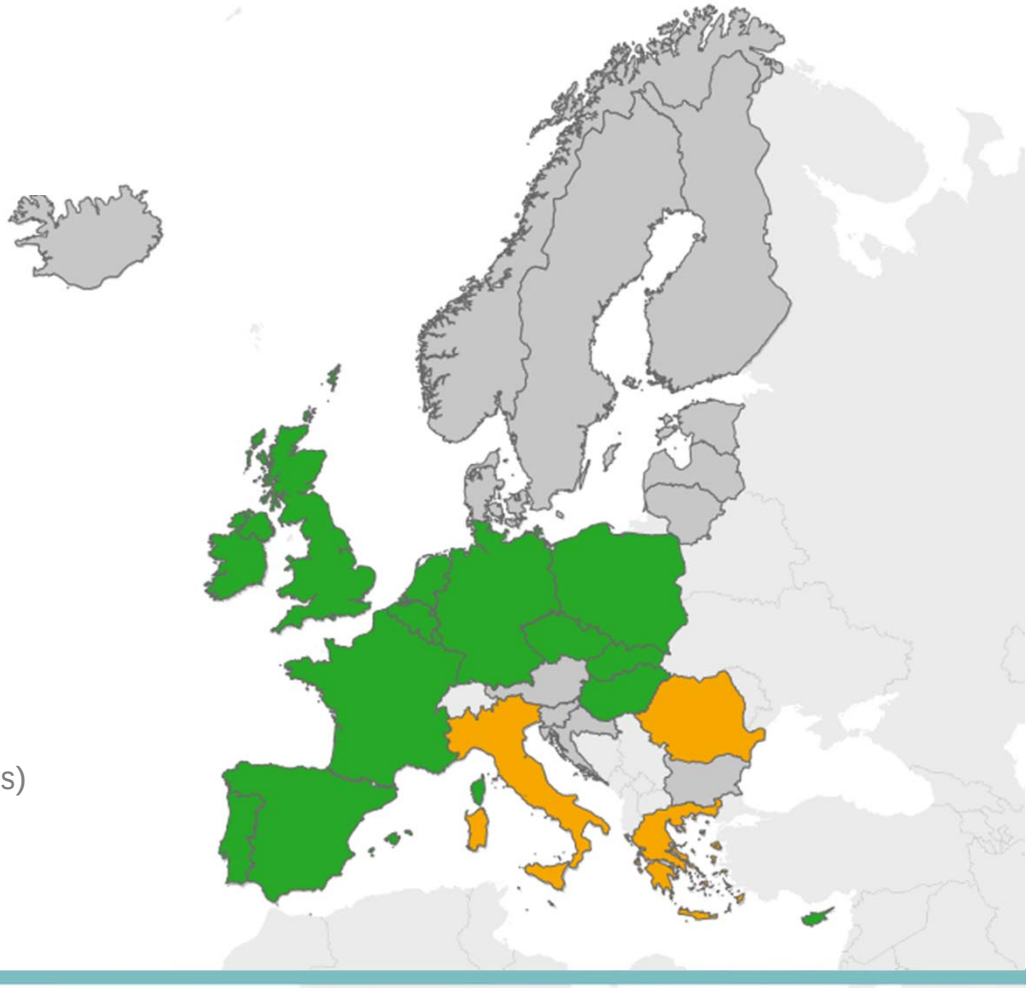
ANTIBIOTIKUM	
Ampicillin	R
Piperacillin/tazobaktam	R
Cefadroxil	R
Imipenem	R
Meropenem	R
Ertapenem	R
Aztreonam	R
Colistin	R
Kloramfenikol	R
Tobramycin	R
Amikacin	R
Netilmicin	R
Trimetoprim	R
Trimetoprim-sulfa	R
Nitrofurantoin	R
Cefotaxim	R
Ceftazidim	R
Gentamicin	R
Tigecycline	?
Fosfomycin	?

Sammanfattning/Ovrigt:
Obs! Mycket omfattande resistensprofil.

Klebsiella pneumoniae: % of invasive isolates with resistance to all antibiotic groups under surveillance*, EU/EEA, 2013

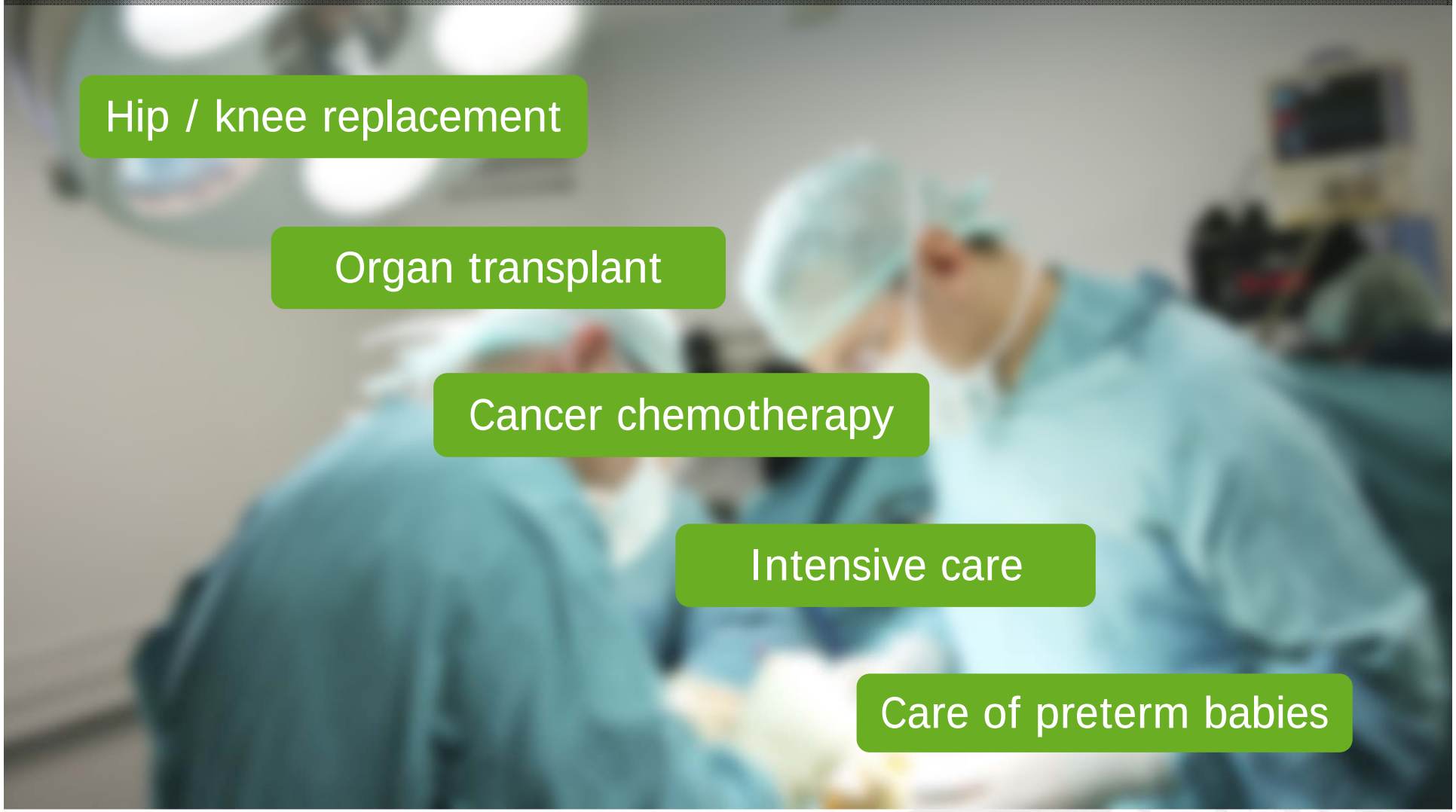
*Third-generation cephalosporins, fluoroquinolones, aminoglycosides, carbapenems and colistin).

Only among isolates that were tested for susceptibility to all these antibiotic groups were included.



Source: EARS-Net, 2014

Modern medicine: not possible without effective antibiotics



Main actions to prevent and control antimicrobial resistance (AMR)

New antimicrobial agents
(with a novel mechanism of action, research, development)

Infection prevention and control
(hand hygiene, screening, isolation)

Prudent use of antimicrobial agents
(only when needed, correct dose, correct dose intervals, correct duration)

http://ecdc.europa.eu/en/activities/diseaseprogrammes/ARHAI/Pages/index.aspx

European Centre for Disease Prevention and Control

Go to Extranet

Search...
Advanced Search

Health Topics | Publications | Data & Tools | Activities | About | News & Media

You are here: Portal Home > English > Activities > Disease Programmes > Antimicrobial Resistance and Healthcare-associated Infections

Antimicrobial Resistance and Healthcare-associated Infections Programme

The programme on Antimicrobial Resistance and Healthcare-Associated Infections (ARHAI) covers two major public health issues:

- Antimicrobial Resistance (AMR), i.e. the ability of microorganisms to become resistant to one or several antimicrobial agents used for therapy or prophylaxis;
- Healthcare-Associated Infections (HAI), i.e. all infections associated with patient care, in particular hospitals and long-term care facilities.

The ARHAI programme focuses on 4 areas of public health: surveillance, response and scientific advice, training and communication to address the threat of antimicrobial resistance and healthcare-associated infections.

Read more about the programme

IN FOCUS

Directory of online resources for prevention and control of antimicrobial resistance and healthcare-associated infections now includes CRE, MRSA and CDI

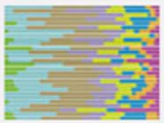
ECDC gathered guidance documents on prevention and control of infection with carbapenem-resistant Enterobacteriaceae (CRE), meticilin-resistant Staphylococcus aureus (MRSA) and Clostridium difficile infections (CDI) that are available online and are published by EU/EEA Member States, ECDC, other agencies and professional societies. This online directory gives an overview of available documents with measures to prevent and control antimicrobial resistance and healthcare-associated infections.

Directory of online resources for prevention and control of antimicrobial resistance and healthcare-associated infections

INTERACTIVE DATABASES

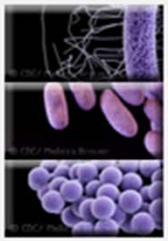
Antimicrobial resistance interactive database (EARS-Net)

Antimicrobial consumption interactive database (ESAC-Net)

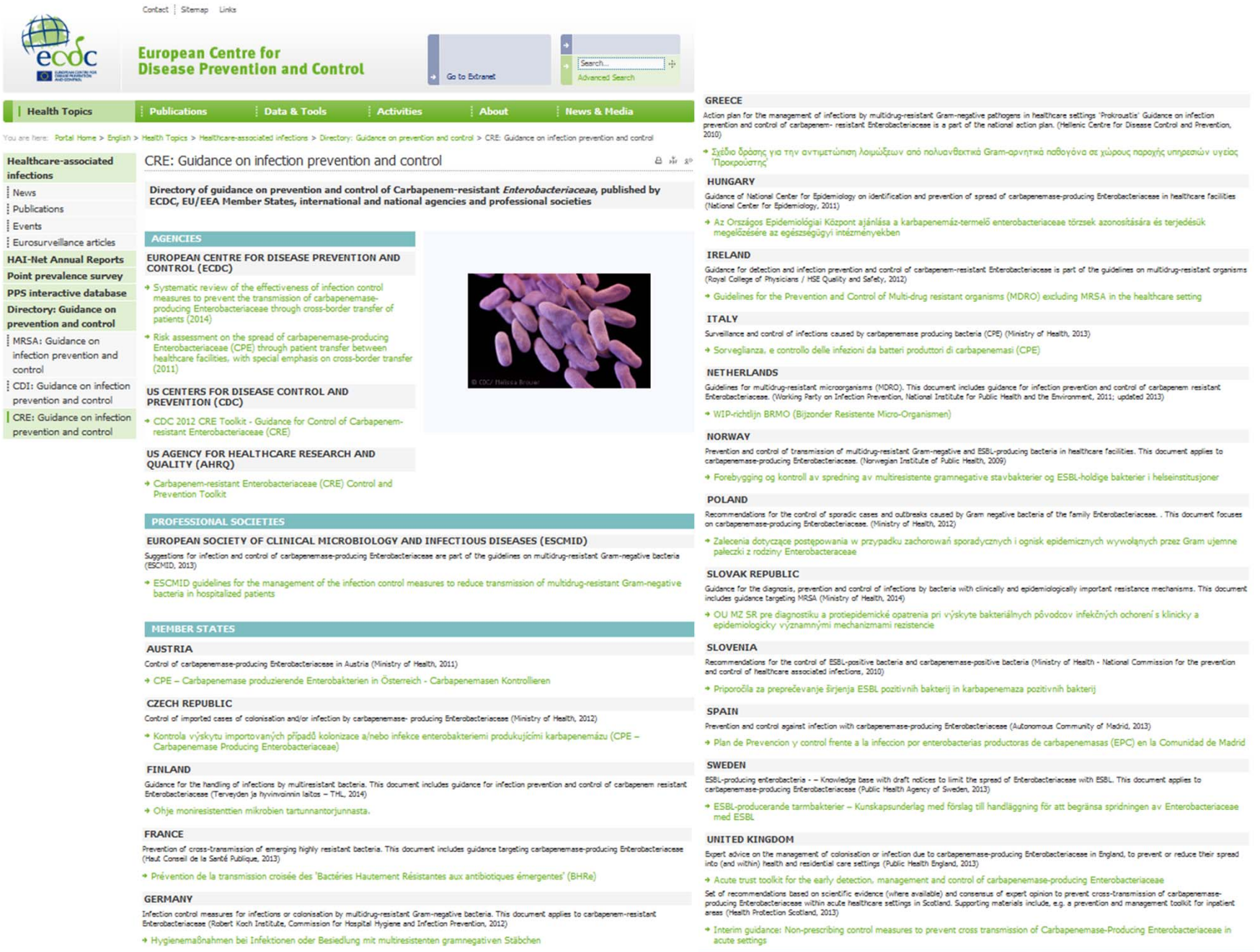


Point prevalence survey interactive database (HAI-Net PPS)

GUIDANCE



Directory of online resources: Prevention and control of antimicrobial resistance and healthcare-associated infections



Contact | Sitemap | Links

European Centre for Disease Prevention and Control

Go to Extranet | Search... | Advanced Search

Health Topics | Publications | Data & Tools | Activities | About | News & Media

You are here: Portal Home > English > Health Topics > Healthcare-associated infections > Directory: Guidance on prevention and control > CRE: Guidance on infection prevention and control

Healthcare-associated infections
- News
- Publications
- Events
- Eurosurveillance articles

HAI-Net Annual Reports

Point prevalence survey

PPS interactive database

Directory: Guidance on prevention and control
- MRSA: Guidance on infection prevention and control
- CDI: Guidance on infection prevention and control
- CRE: Guidance on infection prevention and control

CRE: Guidance on infection prevention and control

Directory of guidance on prevention and control of Carbapenem-resistant *Enterobacteriaceae*, published by ECDC, EU/EEA Member States, international and national agencies and professional societies

AGENCIES

EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL (ECDC)

- Systematic review of the effectiveness of infection control measures to prevent the transmission of carbapenemase-producing Enterobacteriaceae through cross-border transfer of patients (2014)
- Risk assessment on the spread of carbapenemase-producing Enterobacteriaceae (CPE) through patient transfer between healthcare facilities, with special emphasis on cross-border transfer (2011)

US CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)

- CDC 2012 CRE Toolkit - Guidance for Control of Carbapenem-resistant Enterobacteriaceae (CRE)

US AGENCY FOR HEALTHCARE RESEARCH AND QUALITY (AHRQ)

- Carbapenem-resistant Enterobacteriaceae (CRE) Control and Prevention Toolkit

PROFESSIONAL SOCIETIES

EUROPEAN SOCIETY OF CLINICAL MICROBIOLOGY AND INFECTIOUS DISEASES (ESCMID)

Suggestions for infection and control of carbapenemase-producing Enterobacteriaceae are part of the guidelines on multidrug-resistant Gram-negative bacteria (ESCMID, 2013)

- ESCMID guidelines for the management of the infection control measures to reduce transmission of multidrug-resistant Gram-negative bacteria in hospitalized patients

MEMBER STATES

AUSTRIA

Control of carbapenemase-producing Enterobacteriaceae in Austria (Ministry of Health, 2011)

- CPE – Carbapenemase produzierende Enterobakterien in Österreich - Carbapenemasen Kontrollieren

CZECH REPUBLIC

Control of imported cases of colonisation and/or infection by carbapenemase- producing Enterobacteriaceae (Ministry of Health, 2012)

- Kontrola výskytu importovaných případů kolonizace a/nebo infekce enterobakteriemi produkujícími karbapenemázu (CPE – Carbapenemase Producing Enterobacteriaceae)

FINLAND

Guidance for the handling of infections by multiresistant bacteria. This document includes guidance for infection prevention and control of carbapenem resistant Enterobacteriaceae (Terveyden ja hyvinvoinnin laitos – THL, 2014)

- Ohje moniresistenttien mikrobien tartunnantorjunnasta.

FRANCE

Prevention of cross-transmission of emerging highly resistant bacteria. This document includes guidance targeting carbapenemase-producing Enterobacteriaceae (Haut Conseil de la Santé Publique, 2013)

- Prévention de la transmission croisée des 'Bactéries Hautement Résistantes aux antibiotiques émergentes' (BHRe)

GERMANY

Infection control measures for infections or colonisation by multidrug-resistant Gram-negative bacteria. This document applies to carbapenem-resistant Enterobacteriaceae (Robert Koch Institute, Commission for Hospital Hygiene and Infection Prevention, 2012)

- Hygienemaßnahmen bei Infektionen oder Besiedlung mit multiresistenten gramnegativen Stäbchen

GREECE

Action plan for the management of infections by multidrug-resistant Gram-negative pathogens in healthcare settings 'Prokroustis' Guidance on infection prevention and control of carbapenem- resistant Enterobacteriaceae is a part of the national action plan. (Hellenic Centre for Disease Control and Prevention, 2010)

- Σχέδιο δράσης για την αντιμετώπιση λοιμώξεων από πολυανθεκτικά Gram-αρνητικά παθογόνα σε χώρους παροχής υπηρεσιών υγείας 'Προκρούστης'

HUNGARY

Guidance of National Center for Epidemiology on identification and prevention of spread of carbapenemase-producing Enterobacteriaceae in healthcare facilities (National Center for Epidemiology, 2011)

- Az Országos Epidemiológiai Központ ajánlása a karbapenemáz-termelő enterobacteriaceae törzsek azonosítására és terjedésük megelőzésére az egészségügyi intézményekben

IRELAND

Guidance for detection and infection prevention and control of carbapenem-resistant Enterobacteriaceae is part of the guidelines on multidrug-resistant organisms (Royal College of Physicians / HSE Quality and Safety, 2012)

- Guidelines for the Prevention and Control of Multi-drug resistant organisms (MDRO) excluding MRSA in the healthcare setting

ITALY

Surveillance and control of infections caused by carbapenemase producing bacteria (CPE) (Ministry of Health, 2013)

- Sorveglianza, e controllo delle infezioni da batteri produttori di carbapenemasi (CPE)

NETHERLANDS

Guidelines for multidrug-resistant microorganisms (MDRO). This document includes guidance for infection prevention and control of carbapenem resistant Enterobacteriaceae. (Working Party on Infection Prevention, National Institute for Public Health and the Environment, 2011; updated 2013)

- WIP-richtlijn BRMO (Bijzonder Resistente Micro-Organismen)

NORWAY

Prevention and control of transmission of multidrug-resistant Gram-negative and ESBL-producing bacteria in healthcare facilities. This document applies to carbapenemase-producing Enterobacteriaceae. (Norwegian Institute of Public Health, 2009)

- Forebygging og kontroll av spredning av multiresistente gramnegative stavbakterier og ESBL-holdige bakterier i helseinstitusjoner

POLAND

Recommendations for the control of sporadic cases and outbreaks caused by Gram negative bacteria of the family Enterobacteriaceae. . This document focuses on carbapenemase-producing Enterobacteriaceae. (Ministry of Health, 2012)

- Zalecenia dotyczące postępowania w przypadku zachorowań sporadycznych i ognisk epidemicznych wywołanych przez Gram ujemne pałeczki z rodziny Enterobacteraceae

SLOVAK REPUBLIC

Guidance for the diagnosis, prevention and control of infections by bacteria with clinically and epidemiologically important resistance mechanisms. This document includes guidance targeting MRSA (Ministry of Health, 2014)

- OU MZ SR pre diagnostiku a protiepidemické opatrenia pri výskyte bakteriálnych pôvodcov infekčných ochorení s klinicky a epidemiologicky významnými mechanizmami rezistencie

SLOVENIA

Recommendations for the control of ESBL-positive bacteria and carbapenemase-positive bacteria (Ministry of Health - National Commission for the prevention and control of healthcare associated infections, 2010)

- Priporočila za preprečevanje širjenja ESBL pozitivnih bakterij in karbapenemaza pozitivnih bakterij

SPAIN

Prevention and control against infection with carbapenemase-producing Enterobacteriaceae (Autonomous Community of Madrid, 2013)

- Plan de Prevencion y control frente a la infeccion por enterobacterias productoras de carbapenemasas (EPC) en la Comunidad de Madrid

SWEDEN

ESBL-producing enterobacteria - – Knowledge base with draft notices to limit the spread of Enterobacteriaceae with ESBL. This document applies to carbapenemase-producing Enterobacteriaceae (Public Health Agency of Sweden, 2013)

- ESBL-producerande tarmbakterier – Kunskapsunderlag med förslag till handläggning för att begränsa spridningen av Enterobacteriaceae med ESBL

UNITED KINGDOM

Expert advice on the management of colonisation or infection due to carbapenemase-producing Enterobacteriaceae in England, to prevent or reduce their spread into (and within) health and residential care settings (Public Health England, 2013)

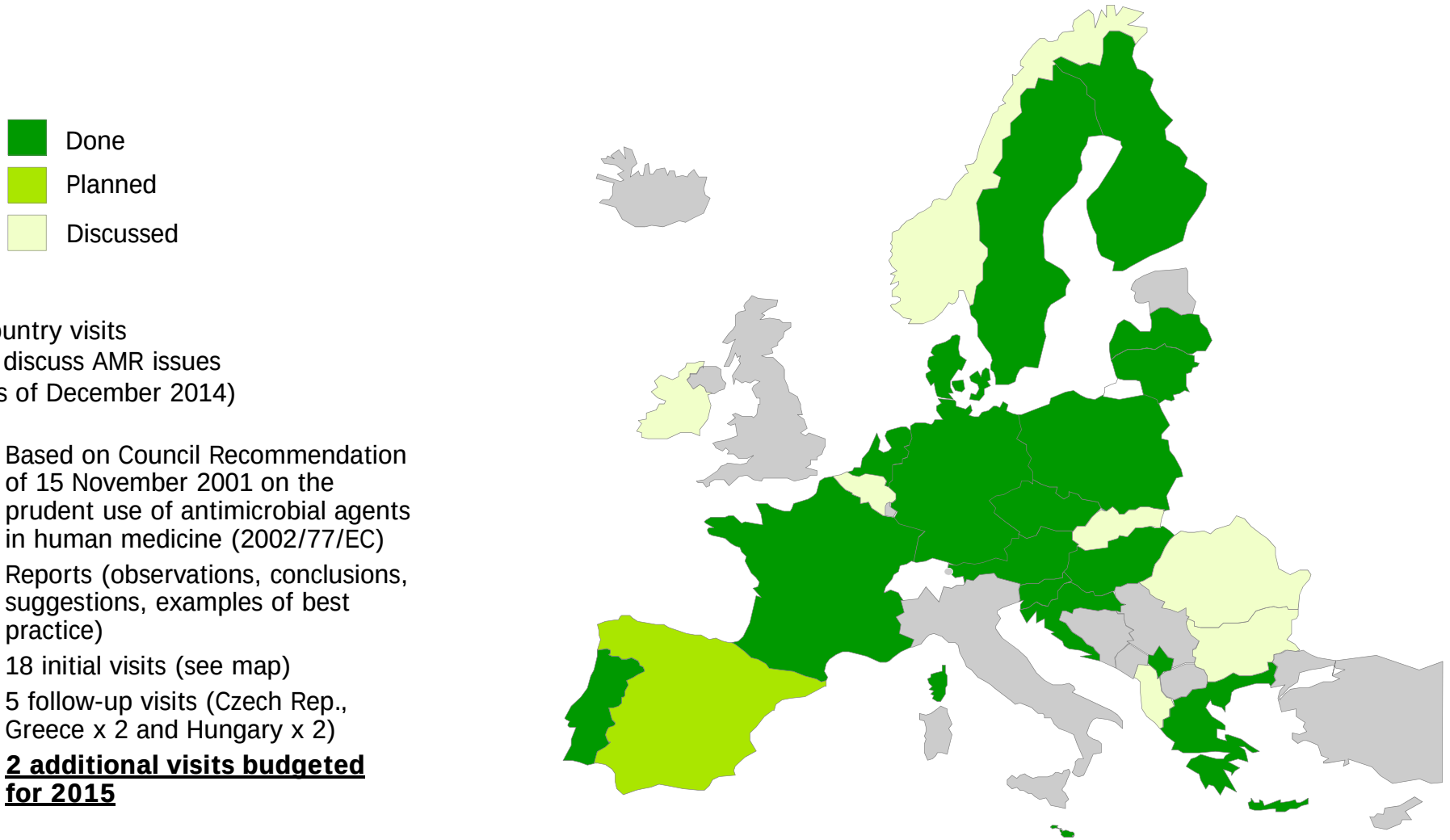
- Acute trust toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae

Set of recommendations based on scientific evidence (where available) and consensus of expert opinion to prevent cross-transmission of carbapenemase-producing Enterobacteriaceae within acute healthcare settings in Scotland. Supporting materials include, e.g. a prevention and management toolkit for inpatient areas (Health Protection Scotland, 2013)

- Interim guidance: Non-prescribing control measures to prevent cross transmission of Carbapenemase-Producing Enterobacteriaceae in acute settings

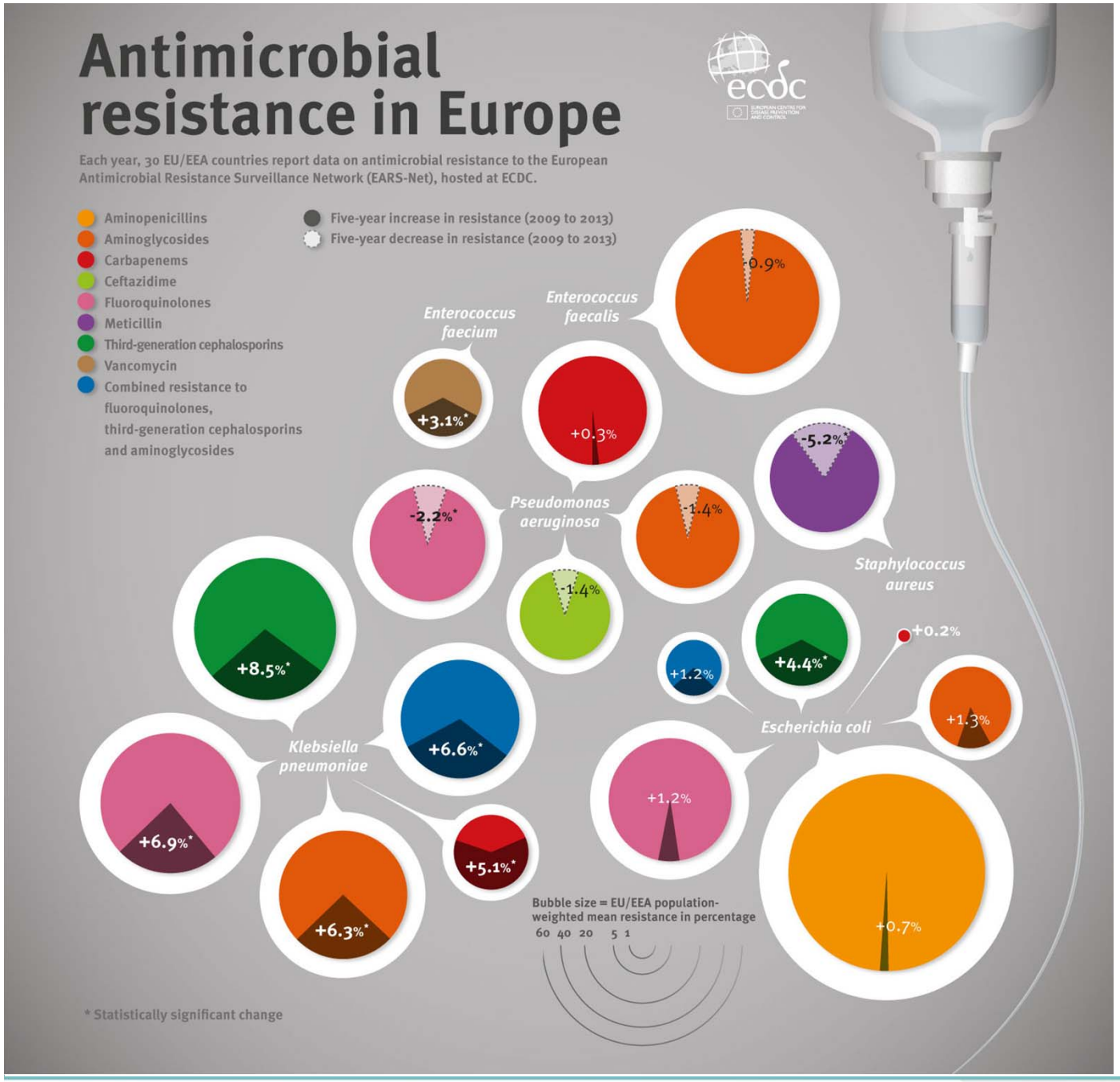
Source: ECDC, 2014. http://www.ecdc.europa.eu/en/healthtopics/Healthcare-associated_infections/guidance-infection-prevention-control/Pages/guidance-prevention-control-infections-caused-by-multidrug-resistant-bacteria-and-healthcare-associated-infections.aspx

Country visits to discuss antimicrobial resistance (AMR) issues, 2006-2014



Country visits
to discuss AMR issues
(as of December 2014)

- Based on Council Recommendation of 15 November 2001 on the prudent use of antimicrobial agents in human medicine (2002/77/EC)
- Reports (observations, conclusions, suggestions, examples of best practice)
- 18 initial visits (see map)
- 5 follow-up visits (Czech Rep., Greece x 2 and Hungary x 2)
- **2 additional visits budgeted for 2015**



Thank you!

Source: EARS-Net, 2014. Infographic: A. Haeger, ECDC.