GREECE:
HYGIENE POLICY FOR THE PREVENTION AND CONTROL OF NOSOCOMIAL INFECTIONS

Prof. Athanasios Tsakris MD, PhD, FRCPath

Department of Microbiology
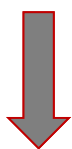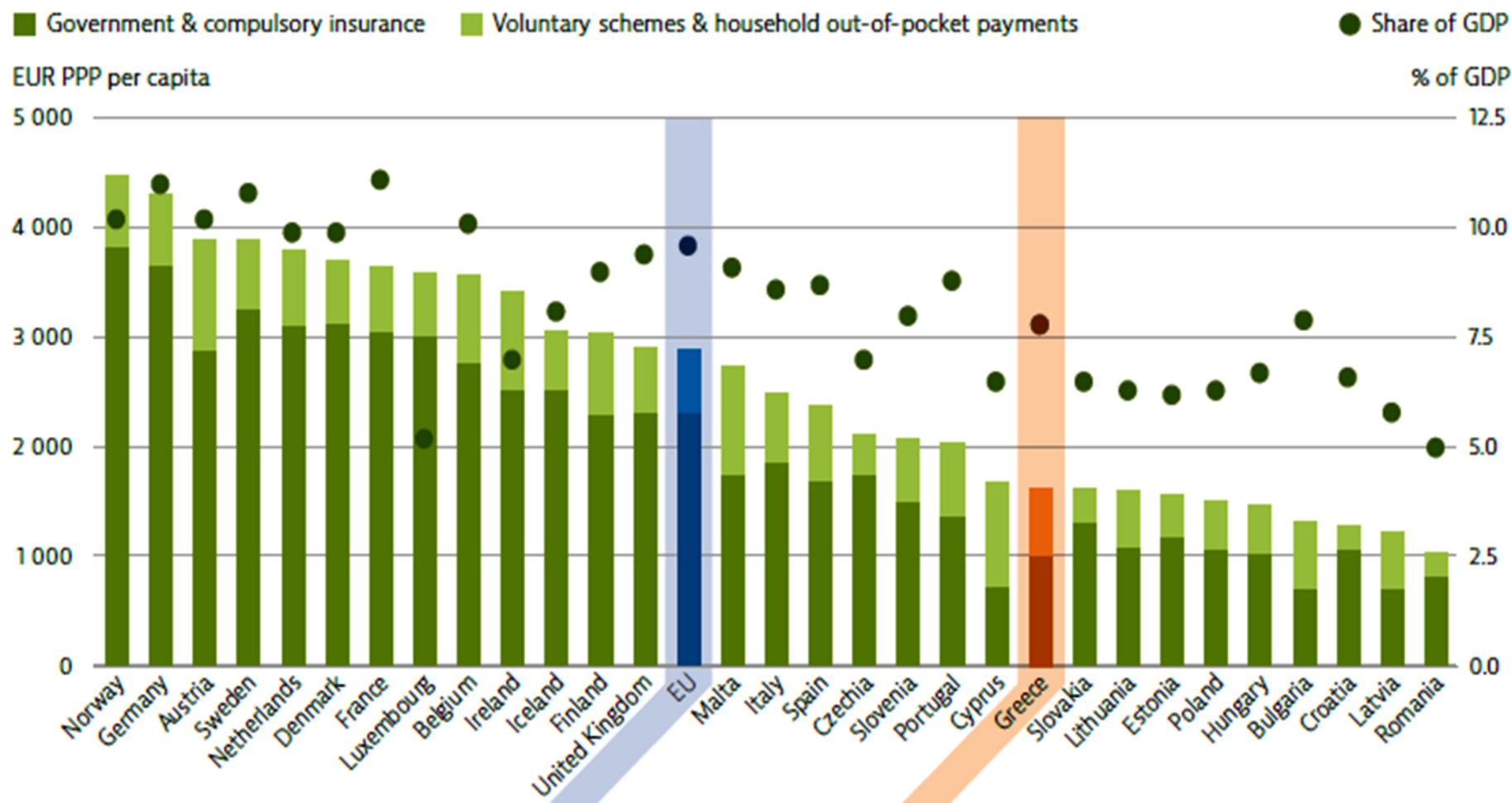
Medical School

University of Athens

What is the health profile in Greece ?

▸ Health spending per capita: **45 % <u>less</u>** than the EU average
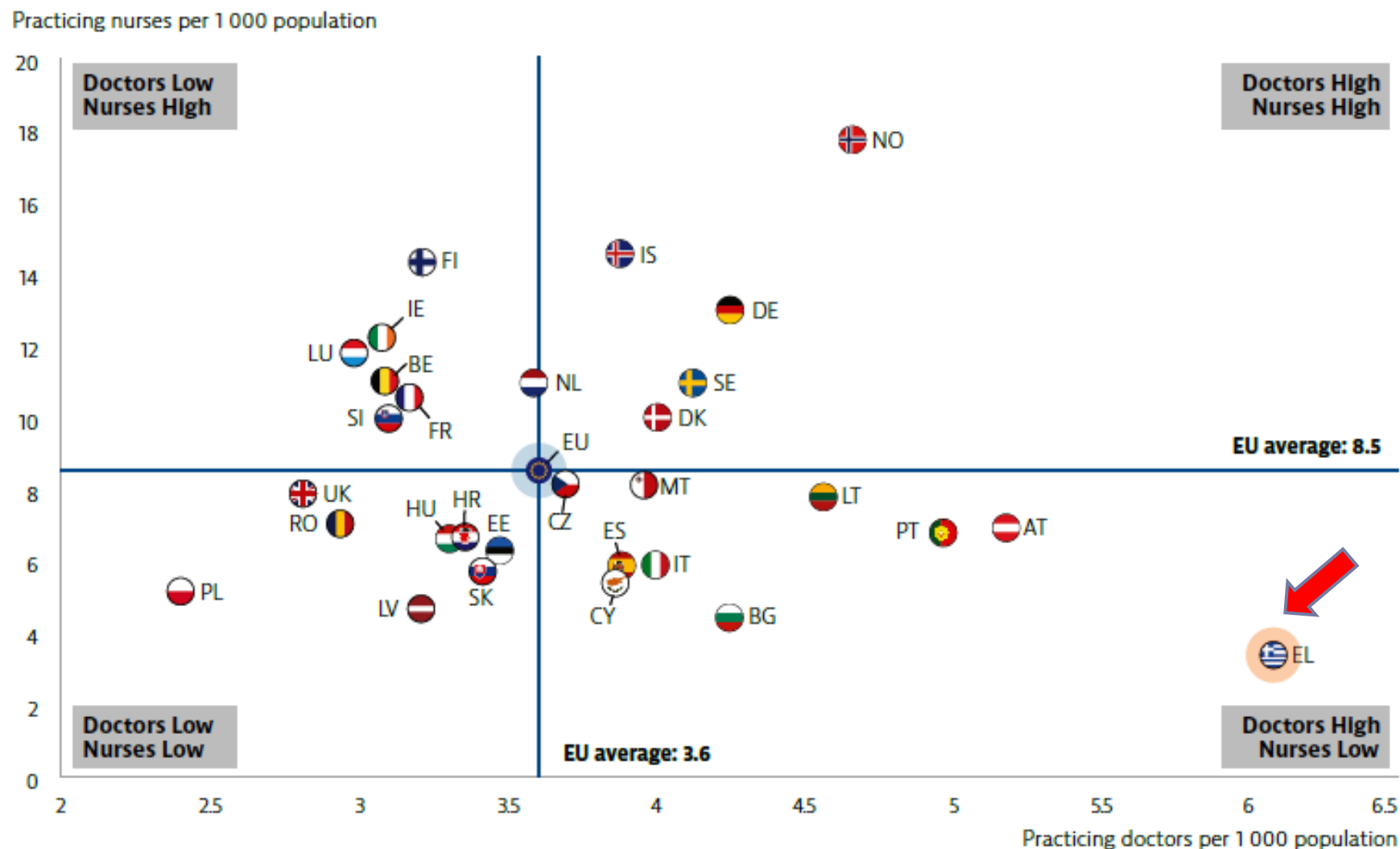
  ▸ In 2017 Greece devoted 8 % of GDP to health

Greece : 1,623 €/person
vs
EU: 2,884 €/person

■ Government & compulsory insurance ■ Voluntary schemes & household out-of-pocket payments ● Share of GDP

EUR PPP per capita

% of GDP

Norway, Germany, Austria, Sweden, Netherlands, Denmark, France, Luxembourg, Belgium, Ireland, Iceland, Finland, United Kingdom, EU, Malta, Italy, Spain, Czechia, Slovenia, Portugal, Cyprus, Greece, Slovakia, Lithuania, Estonia, Poland, Hungary, Bulgaria, Croatia, Latvia, Romania

Source: OECD Health Statistics 2019 (data refer to 2017).

▸ State of Health in the EU · Greece · Country Health Profile 2019

Health workforce in Greece

OECD
BETTER POLICIES FOR BETTER LIVES

European Observatory
on Health Systems and Policies
a partnership hosted by WHO

▶ **Large imbalance** in the distribution of the health workforce, both geographically and in terms of skill mix

▶ Greece has the highest number of doctors, along with the lowest number of nurses per 1,000 population in the EU

Practicing nurses per 1 000 population

Doctors Low Nurses High

Doctors High Nurses High

NO

IS

DE

FI

IE

LU

BE

NL

SE

SI

FR

DK

EU

UK

MT

LT

RO

HU

HR

EE

CZ

ES

PT

AT

PL

SK

IT

LV

CY

BG

EL

Doctors Low Nurses Low

EU average: 3.6

Doctors High Nurses Low

EU average: 8.5

Practicing doctors per 1 000 population

In Greece (a) data refer to all doctors licensed to practice, resulting in a large overestimation and (b) the number of nurses is underestimated as it only includes those working in hospital

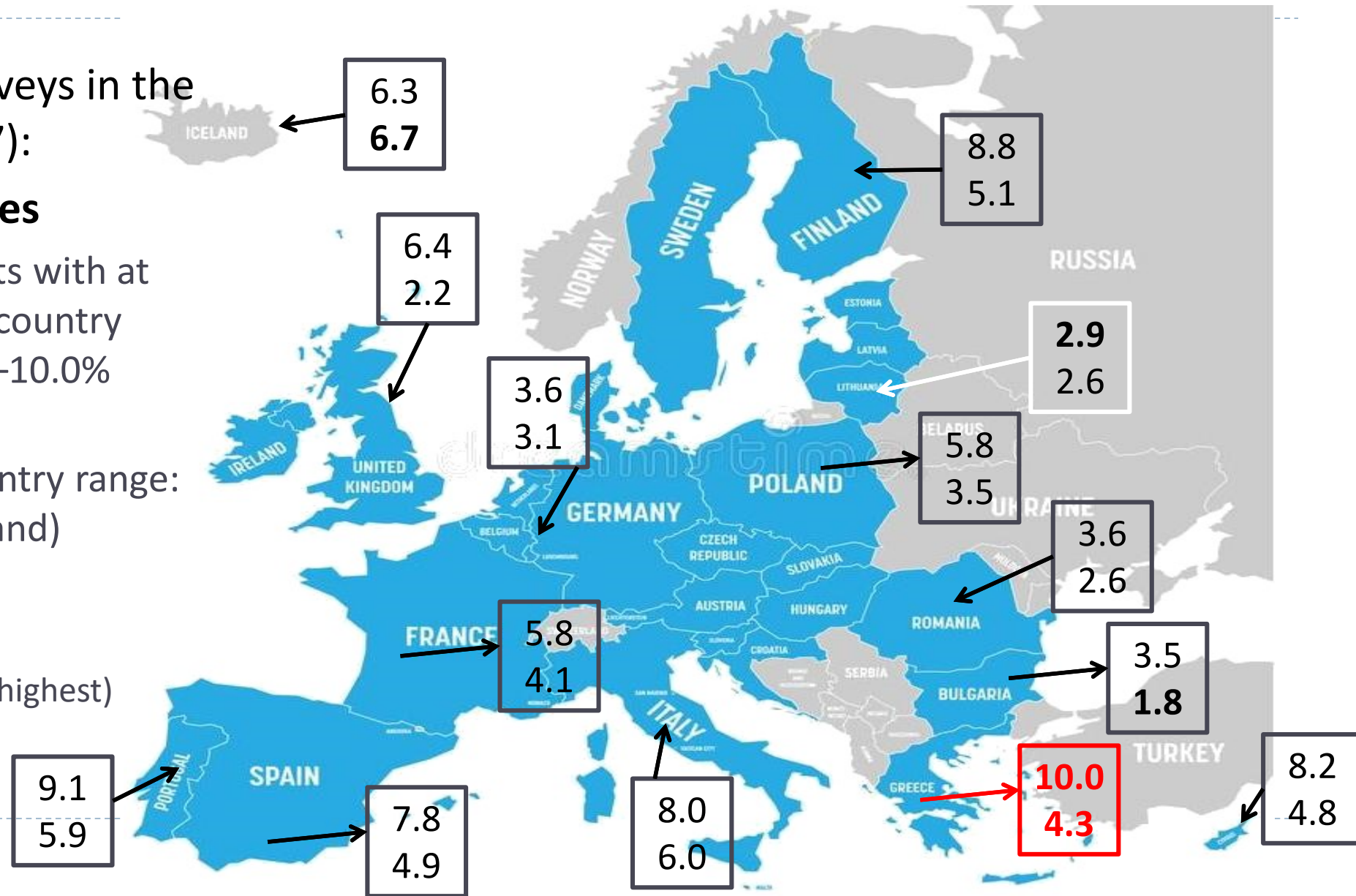# Prevalence and Estimated Incidence of HAI in acute care hospitals, Europe

Point Prevalence Surveys in the EU/EEA (2016 – 2017):

- **Participating countries**
  - **Prevalence** of patients with at least one HAI: **5.9%** (country range: 2.9 Lithuania –10.0% Greece)
  - **Incidence: 3.7%** (country range: 1.8 Bulgaria -6.7 Iceland)

- **In Greece:**
  - **Prevalence:10.0** (the highest)
  - **Incidence: 4.3**

|	
6.3 **6.7**	Iceland
8.8 5.1	
6.4 2.2	
2.9 2.6	
3.6 3.1	
5.8 3.5	
3.6 2.6	
5.8 4.1	
3.5 **1.8**	
9.1 5.9	
7.8 4.9	
8.0 6.0	
10.0 **4.3**	
8.2 4.8	

Antimicrobial resistance (AMR) in HAI and correlation with EARS-Net data

According to Point Prevalence Surveys in the EU/EEA (2016-2017):

- Composite index of AMR: 31.6% (mean of countries: 30.8%)
  - ranged from 0% in Iceland to 68.9% in Romania
  - **Greece: 61.2%**

- CRE: 6.2% (mean of countries: 5.9%)
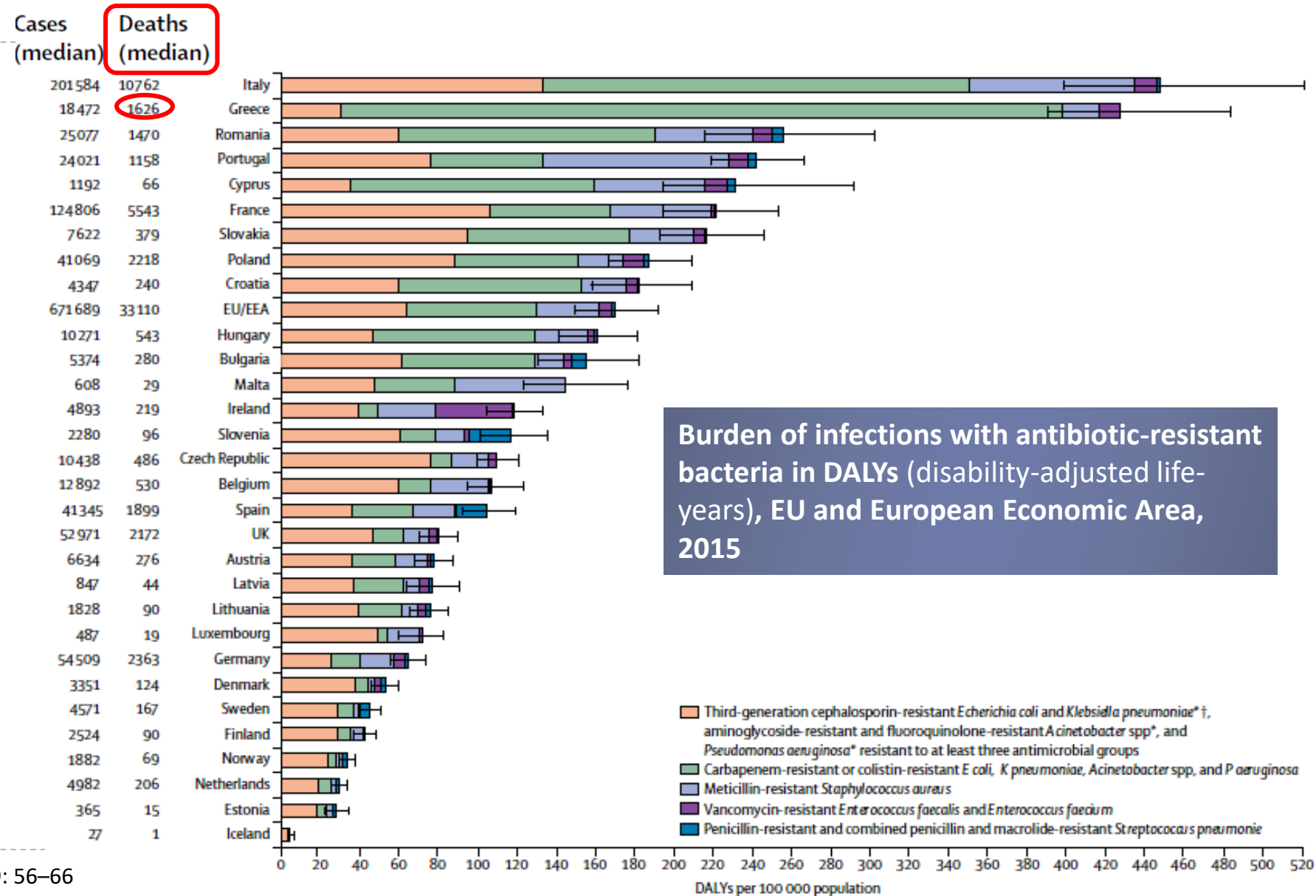 - ranged from 0% in Estonia, Finland, Iceland, Lithuania and UK–Northern Ireland …to **43.7% in Greece**

Correlation between the composite indices of AMR from the PPS in acute care hospitals, 2016-2017 and EARS-Net, 2016 (n = 27 countries)

AMR: 61.2
CRE: 43.7%

Suetens C., *et al. Euro Surveill*. 2018;23(46):pii=1800516.
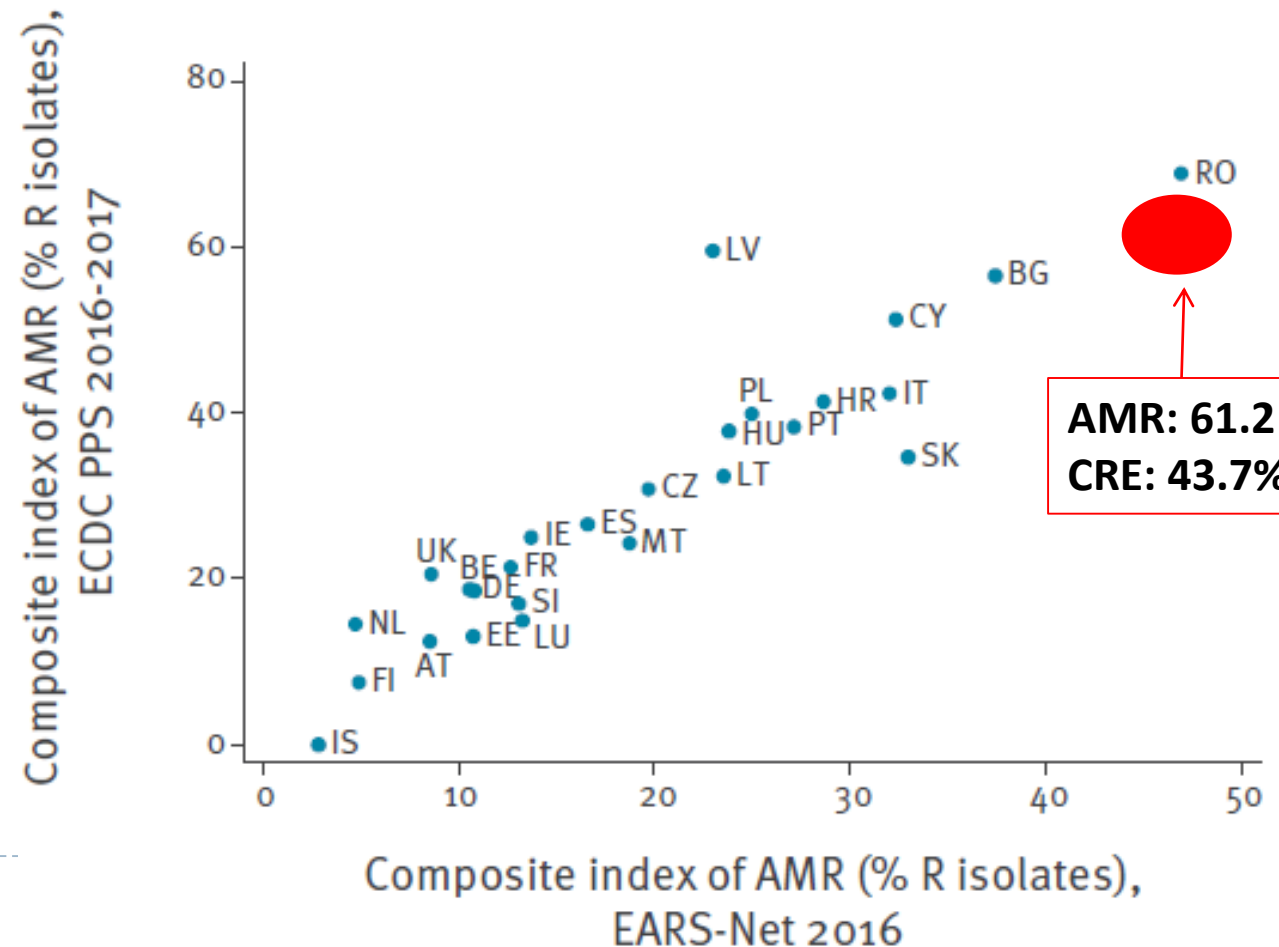
# Antibiotic resistance and attributable deaths: a population-level modelling analysis

▸ Greece has been estimated to have the second highest burden of infections with antibiotic resistant bacteria in the EU (after Italy), resulting in **over 1,600 deaths/year**

Burden of infections with antibiotic-resistant bacteria in DALYs (disability-adjusted life-years), EU and European Economic Area, 2015

▸ Cassini A., *et al. Lancet Infect Dis* 2019; 19: 56–66

The most important cause for the high AMR is probably the consumption of antibiotics

- In the community, the EU/EEA mean consumption of antibiotics in 2017: 18.9 defined daily doses (DDDs) /1000 inhabitants/day, ranging from 8.9 in the Netherlands to 32.1 in Greece

- In acute care hospitals, the EU/EEA mean prevalence of patients receiving at least one antibiotic on a given day in 2016-2017: 30.7%, varied from 14.9% in Hungary to 55.1% in Greece

OECD 2019, AMR - Tackling the Burden in the EU
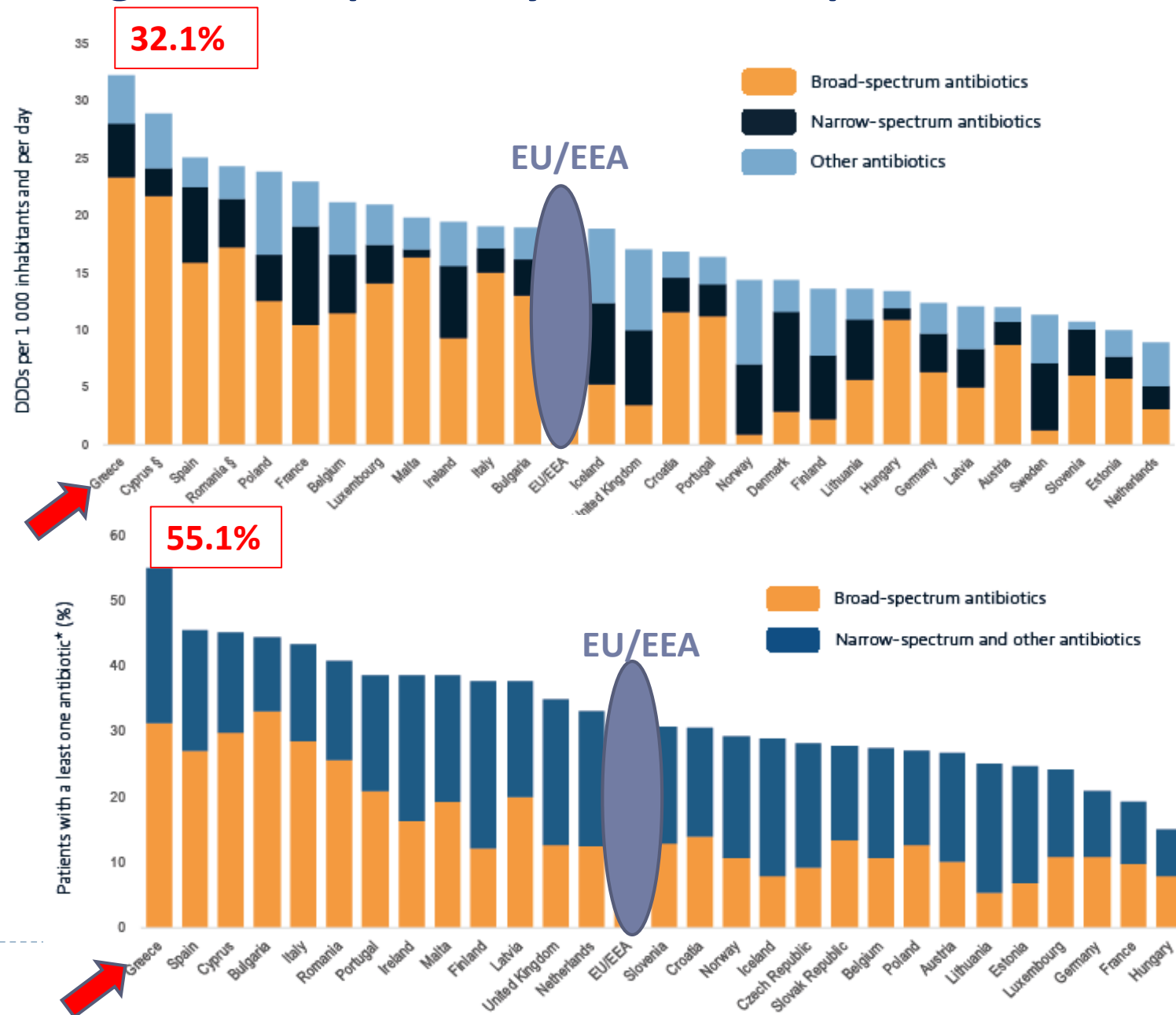
Antibiotic Stewardship programs → example of antibiotic use policy
Selective reporting of antibiotic susceptibility test (AST) results in Europe

36 participating countries
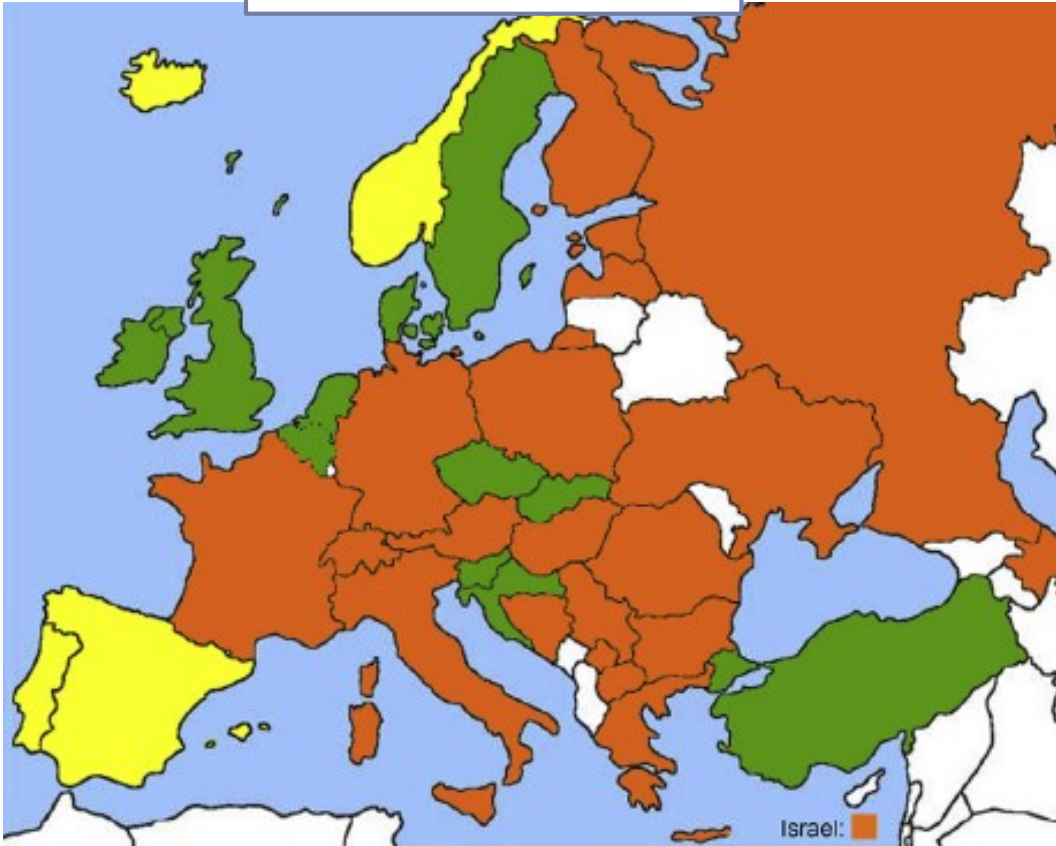
Green: well implemented,
Yellow: partially implemented,
Orange: only local initiatives or not implemented

C. Pulcini *et al. Int J Antimicrob Agents* 2017; 49: 162–166

on behalf of the EUCIC-ESGAP- EUCAST Working Group

Table 1
Examples of selective reporting of antibiotic susceptibility test results for a wild-type (=susceptible) *Escherichia coli* isolated in a urine sample[a]

| Antibiotic	BE	CZ	DK	EE	HR	IE	IT	PL	PT	SE	TR	UK
Ampicillin/ amoxicillin	X		X	X	X	X	X		X	X	X	
Amoxicillin/ clavulanic acid	X	X		X	X			X				X
Pivmecillinam			X									
Temocillin	X											
Piperacillin/ tazobactam	X											
Cefadroxil	X									X		
Cefalexin											X	X
Cefuroxime	X	X		X	X							
Cefaclor												
Cefixime					X							
Ceftriaxone	X											
Ceftazidime				X								
Trimethoprim			X				X		X		X	X
Sulfamethizole			X									
Trimethoprim/ sulfamethoxazole	X	X		X	X		X	X				X
Ciprofloxacin	X			X	X		X	X		X		
Norfloxacin					X							
Gentamicin	X				X		X				X	
Amikacin	X						X					
Nitrofurantoin	X	X	X	X	X	C	X	X	X	X	X	X
Fosfomycin	X						X	X	X		X	

Table 11. Main members of the ICC and work status (Answers by PHA, multiple answers possible)

Who are the main members of the ICCs? (2nd ✓ full time on IC)	AT	DK	FR		IT	PT	ES	NL
Infectious disease specialist	✓	-/✓	✓✓		✓✓	✓✓	✓	✓✓
Clinical microbiologist	✓	✓	✓		✓	✓	✓	✓
Preventive medicine clinician		-/✓	✓		✓		✓	
Another specialist clinician	✓		✓		✓	✓		✓
Microbiologist			✓		✓			
IC nurse	✓	✓	✓		✓	✓	✓	✓
HA			✓		✓		✓	✓

▸ ICC include an ID specialist and an IC nurse

▸

What about members of the Infection Control Committee?

▸ Greece:
  ▸ only the IC nurse works full time on IC
  ▸ No Clinical Microbiologist or Preventive Medical Clinicians

Which members of the ICC work full time on IC?
(ONLY Acute Care Hospitals)
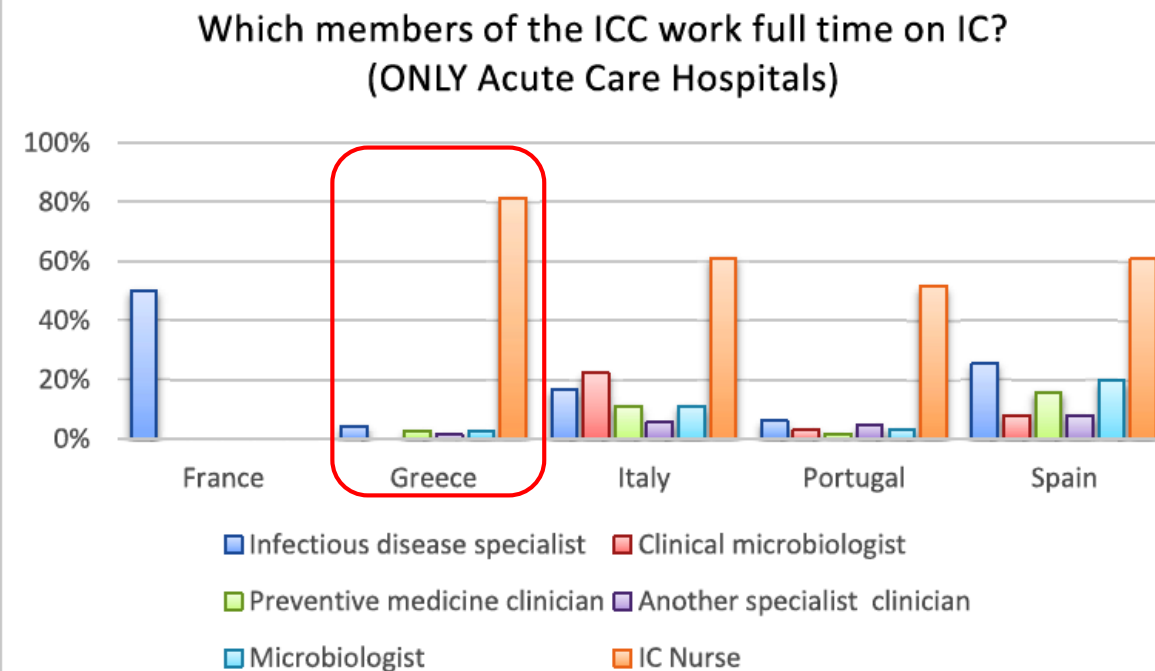
Which other factors affect antimicrobial resistance?

...other factors

1. Health services quality

2. Populations' movement

3. Use of antibiotics in livestock farming and agriculture

4. Climatic conditions

5. Antimicrobial treatment practices

6. Diagnostic tests for early detection of pathogens and their antibiotic resistance

What hospital infection control measures have been adopted in Greece ?

▸ Since 2014 there is a crucial legislation (Government Gazette, FEK no 388) with guidelines and recommendations regarding prevention of hospital infections

▸ With the **FEK 388**, the prevention of hospital infections becomes criterion for

  ▸ the assessment of hospital administrations and

  ▸ the establishment and implementation of infection control programs and annual action plans by all hospitals in the country.

The purpose of this **Ministerial Decision no 114971** *is to define measures, conditions and procedures for addressing antimicrobial resistance, prevention and control of nosocomial infections in health care facilities*

"Hospital Rules of Procedure" for every hospital

▸ The standard formulation of the "Hospital Rules of Procedure" was formulated and sent to the hospitals by National Public Health Organization (NPHO).

▸ The "Hospital Rules of Procedure" contains:

1. Hospital policy
2. Responsibilities and roles for staff and institutions
3. Surveillance - indicators
4. Preventive measures for all procedures
5. Education
6. Crisis response
7. Health professionals' safety
8. Management of antibiotics
9. Annual Action Plan with Location, Report and Budget

ΚΕΝΤΡΟ ΕΛΕΓΧΟΥ &
ΠΡΟΛΗΨΗΣ ΝΟΣΗΜΑΤΩΝ (ΚΕΕΛΠΝΟ)

ΥΠΟΥΡΓΕΙΟ ΥΓΕΙΑΣ

ΟΔΗΓΙΕΣ ΓΙΑ ΤΗ ΣΥΝΤΑΞΗ ΤΟΥ ΕΣΩΤΕΡΙΚΟΥ ΚΑΝΟΝΙΣΜΟΥ
ΠΡΟΛΗΨΗΣ ΚΑΙ ΕΛΕΓΧΟΥ ΛΟΙΜΩΞΕΩΝ
ΣΕ ΧΩΡΟΥΣ ΠΑΡΟΧΗΣ ΥΠΗΡΕΣΙΩΝ ΥΓΕΙΑΣ

ΑΘΗΝΑ 2015

Surveillance of MDROs
National Action Plan (known as "Procrustes")

▶ Mandatory surveillance.

▶ Indicators:

  ▶ **1st** Incidence of BSIs from MDR pathogens/1000 days of hospitalization

    CR *Acinetobacter*, *Pseudomonas*, *Klebsiella* spp.

    MRSA

    VRE

  ▶ **2nd** Compliance with the application of contact precautions

  ▶ **3rd** Microbial resistance surveillance

  ▶ **4th** Antibiotic consumption surveillance at the hospital

Example of surveillance

Total incidence of CRKP

Hospital-associated bloodstream infections (HABSI)
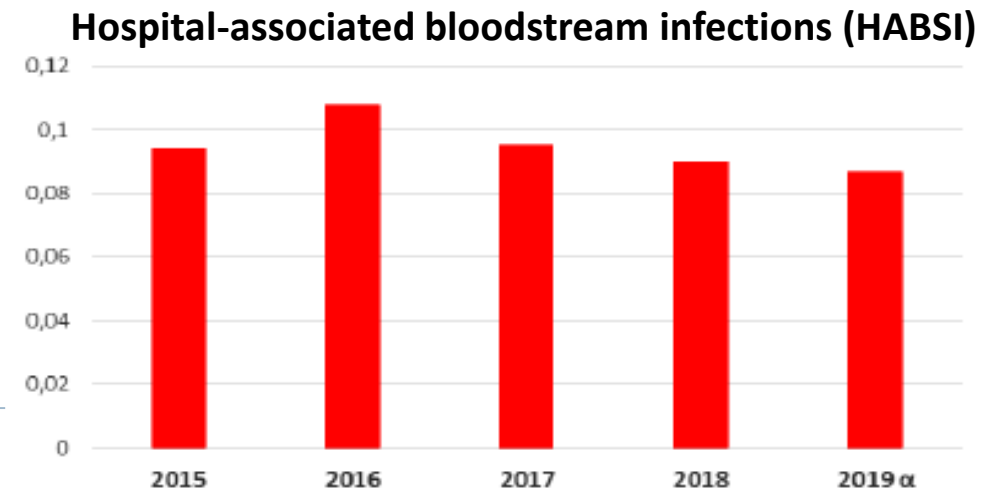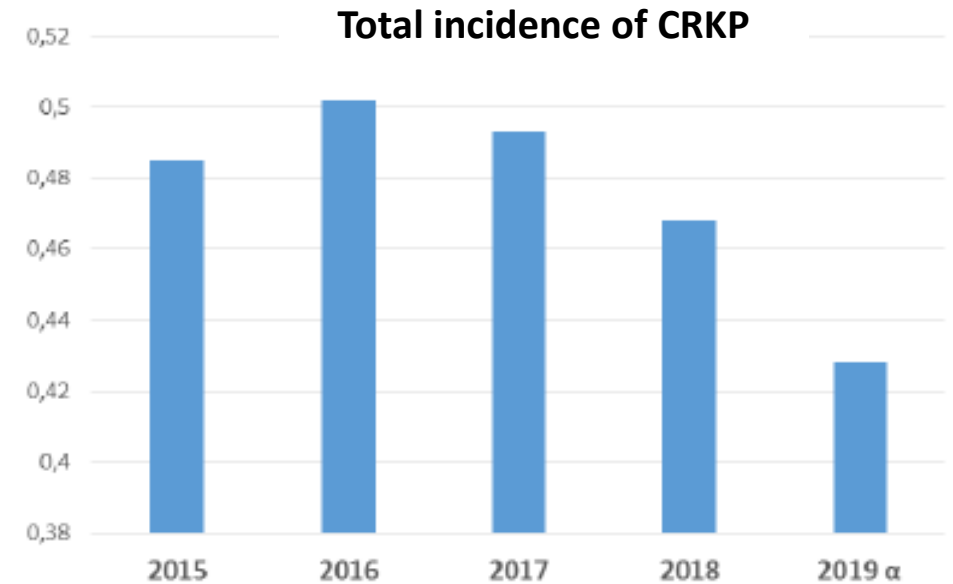
# The Clinical Laboratory in Rapid and Valid Pathogen Detection / Identification and Resistance

▶ Implementation of different methods → Diagnostic Stewardship

| Methods	% adopted from clinical laboratories
Phenotypic methods	
- Automated systems for identification and antibiogram	98%
- Disk methods using specific substrates and inhibitors in non-selective media (Double Disk Synergy Test, Combined Disk Diffusion Test, OXA-48 Disk Test)	87%
- Immuno-chromatographic assays (Coris BioConcept, Quick Chaser IMP)	65%
- Chromogenic culture media	30%
Molecular methods	
- Multiplex PCRs (FilmArray®)	**60%**
- Malti-TOF (mass spectrometry, ribosomal proteins)	**2%**
- PCRs for the detection of resistant genes	**3%**

Examples of phenotypic methods

▶ **Combined disk tests using specific substrates and inhibitors in non-selective media for differentiation of KPCs, MBLs (Fig. 1) , OXA-48-like enzymes (Fig. 2)**
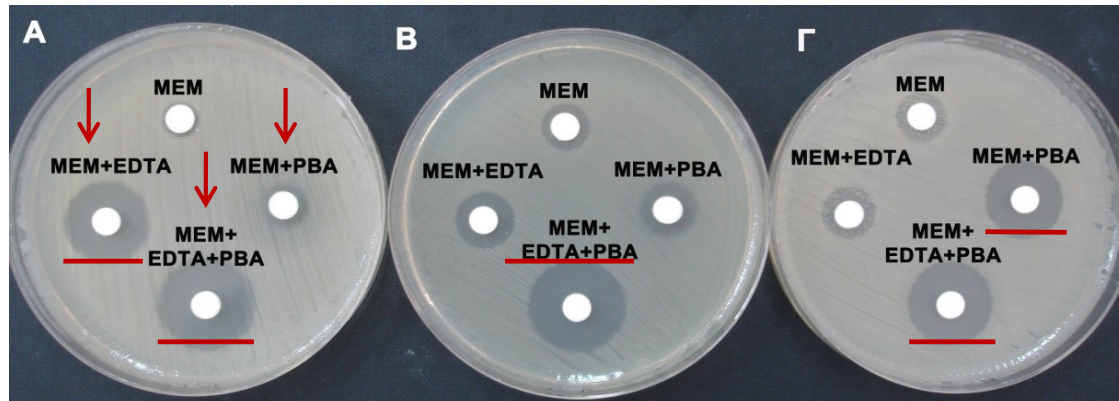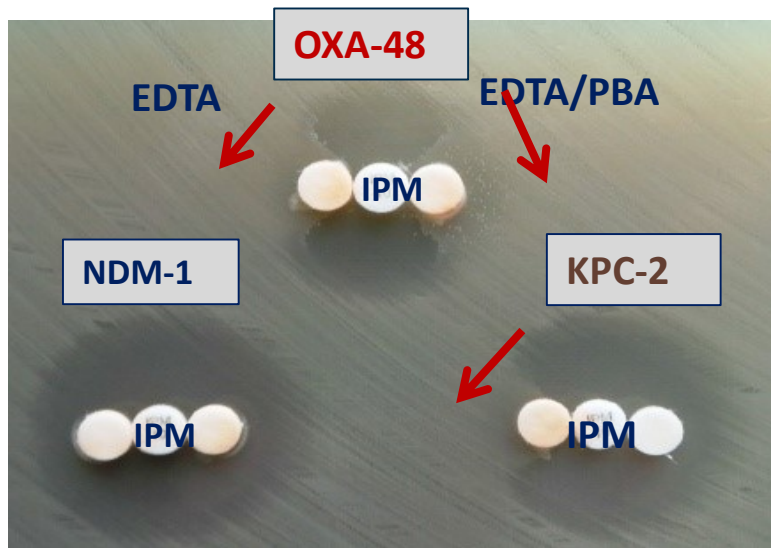

Simple, low-cost techniques that have

been applied to most clinical laboratory

→ detect different enzymes & co-existence of enzymes

→ Important contribution to infection control and co-horting of patients

Tsakris *et al. J Antimicrob Chemother* 2010; 65:1664-710; Tsakris *et al. J Clin Microbiol* 2015; 53:1245-51

Example of the implementation of all these methods
Algorithm for the detection of carbapenemases in a routine laboratory
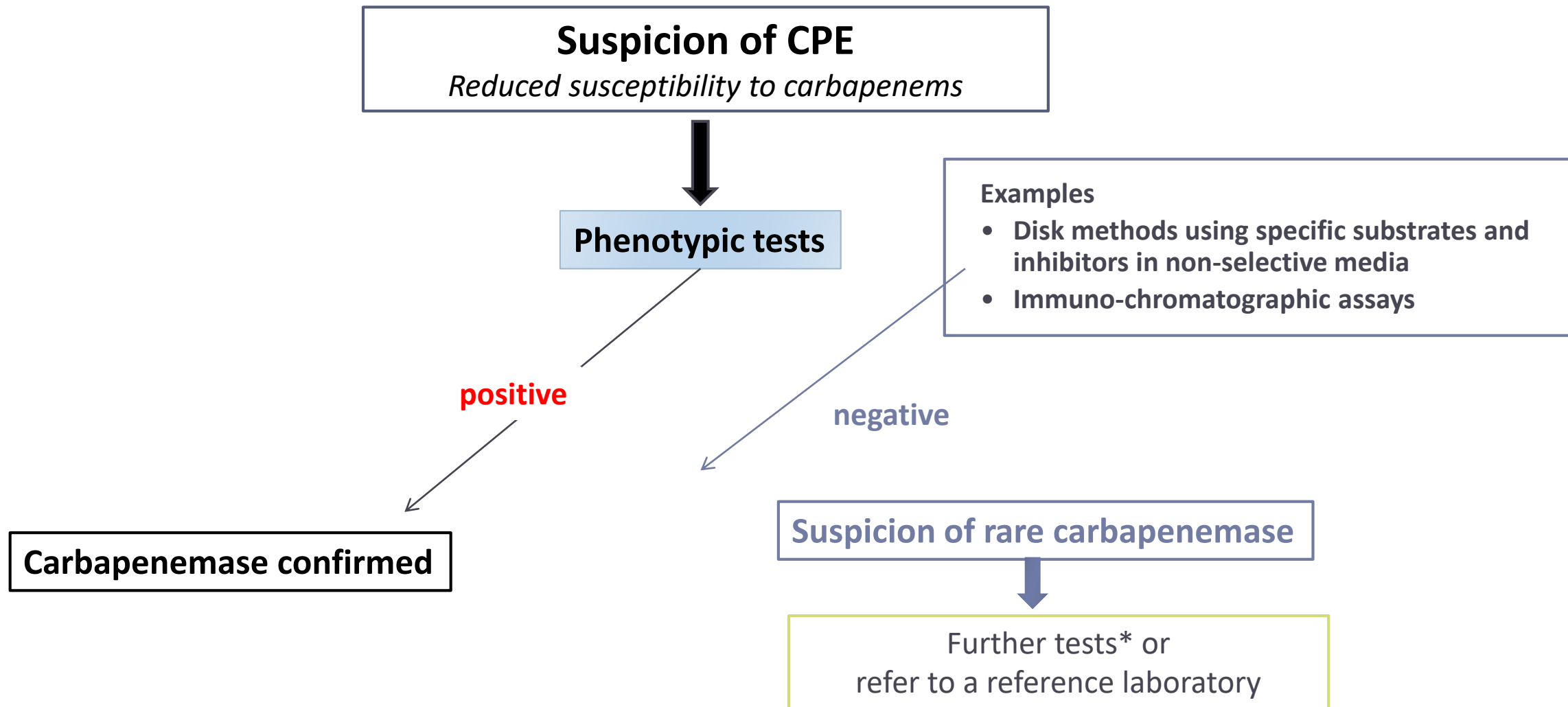
Situation regarding CPE: great heterogeneity → according to "Procrustes" project

National Antibiotic Resistance Surveillance: 3rd indicator

Klebsiella pneumoniae: types of carbapenemase 2015-2018
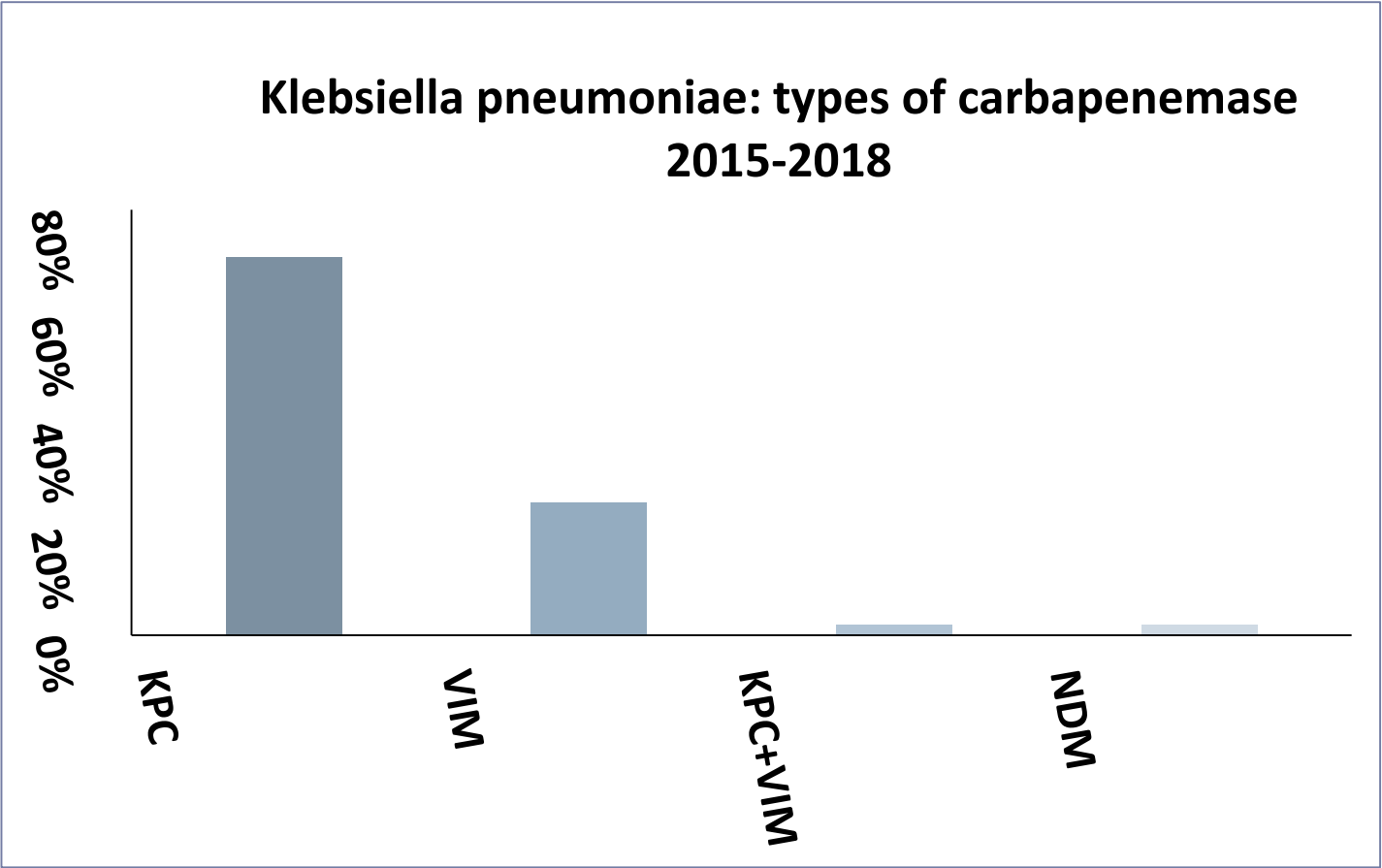
OXA-48 like carbapenemase no under surveillance

Other actions

▸ Joint European Action to Address
  Antimicrobial Resistance and
  Prevention of Infections Related to
  "EU-JAMRAI" Health Care
  Providers

Purpose of the study:

Given the differences in AMR context in European
countries, the objective **is to fill the gap** between
**policy and practice of IC in healthcare facilities based
on evidence-based practices and the national
experience of participating partners**.

NATIONAL PUBLIC
HEALTH ORGANIZATION

Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections

D6.1

Revised guidelines for the implementation of infection control program in healthcare settings

WP6

LEADER

COUNTRY	NAME
GREECE	HCDCP

WP6.1.1 PARTICIPATING PARTNERS

COUNTRY	NAME
AUSTRIA	GOG
FRANCE	MoH-FR
	INSERM
GREECE	7HC
ITALY	UNIFG
	ISS
PORTUGAL	DGS
SPAIN	AEMPS
	GENCAT
	IdIsBA
	FFIS
	FMS
	SAS
	ISCII
	SERMAS

Co-Funded by the
Health Programme
of the European Union

# According to "EU-JAMRAI" study results:

Present situation

▸ A national policy on the prevention of HAIs exists

▸ HAl Surveillance Systems have been developed at a national level; the majority of hospitals participate

▸ IC Programs at hospital level have been implemented - with specific objectives

▸ IC training programs for healthcare professionals have been introduced

What can we improve?

In which areas should we make improvements?

- ▶ Strengthening of hospitals with <u>financial and human resources</u>, including qualified personnel dealing exclusively with IC activities

- ▶ Reliable & rapid microbiological diagnostics according to the specific needs
- ▶ Diagnostic stewardship programs- Algorithms
- ▶ Optimal use of diagnosis in treatment decision (*escalation or de-escalation*)

- ▶ Active involvement of hospital hierarchy (Hospital Administrators and Clinical Department Heads responsible for IC)
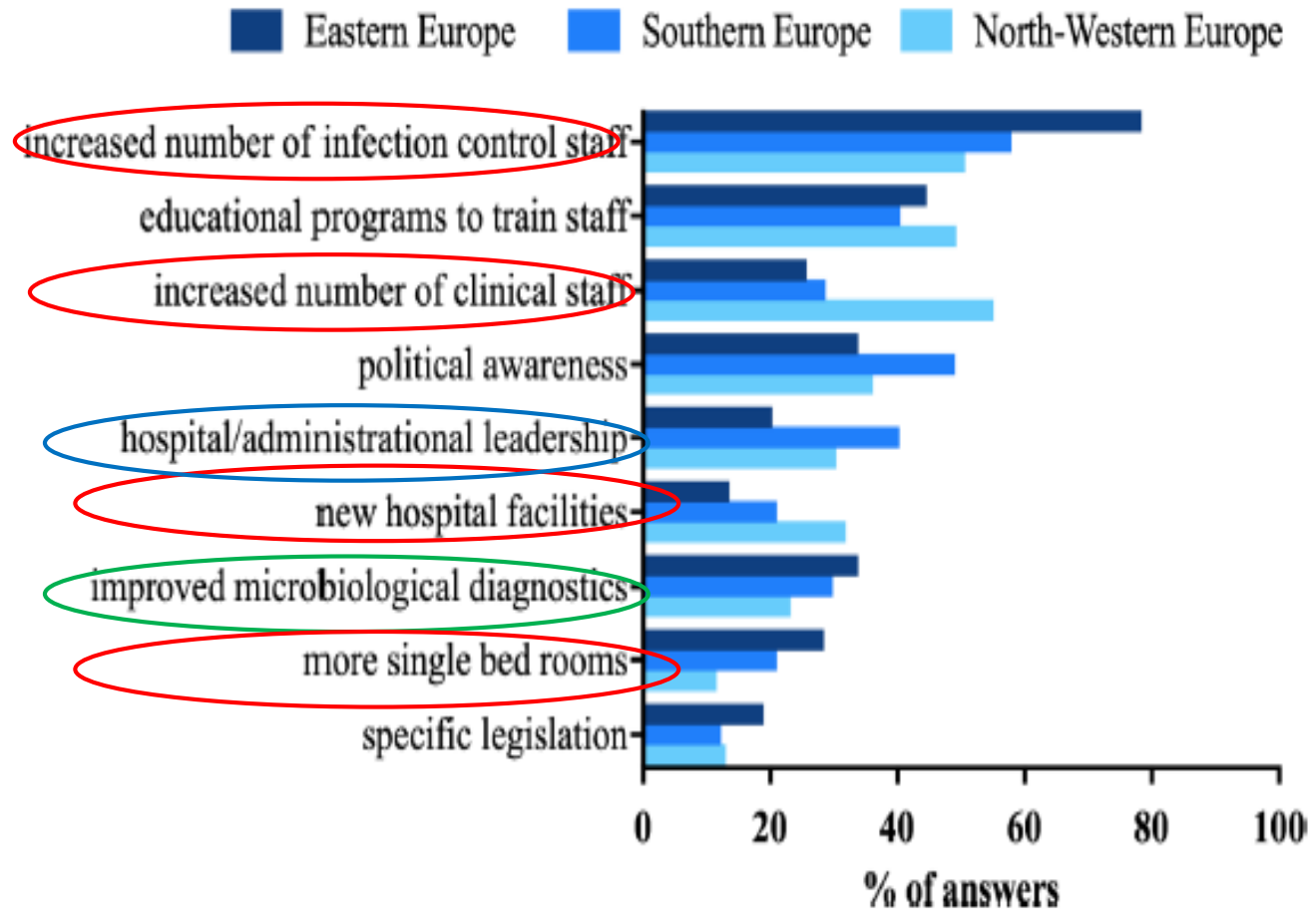
Tacconelli E., *et al. BMJ Open* 2019;9:e027683