Project StAR-Symposium

European perspective

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CHARITÉ

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European Centre for Disease Prevention and Control
An agency of the European Union

All topics: A to Z | News & events | Publications & data | Tools | About us

Home > All topics: A to Z > Antimicrobial resistance

Antimicrobial resistance

Launch event: European Antibiotic Awareness Day | Antimicrobial use in hospitals | Data from the Atlas | Directory: Guidance on prevention and control

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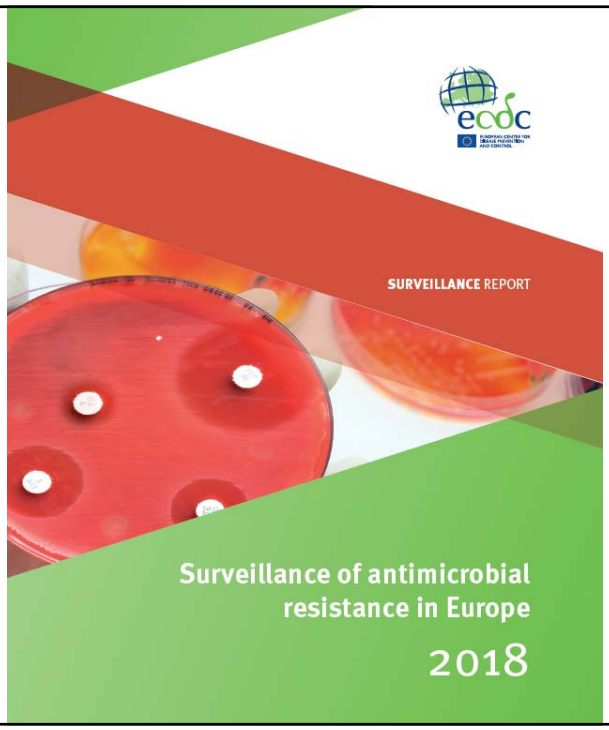
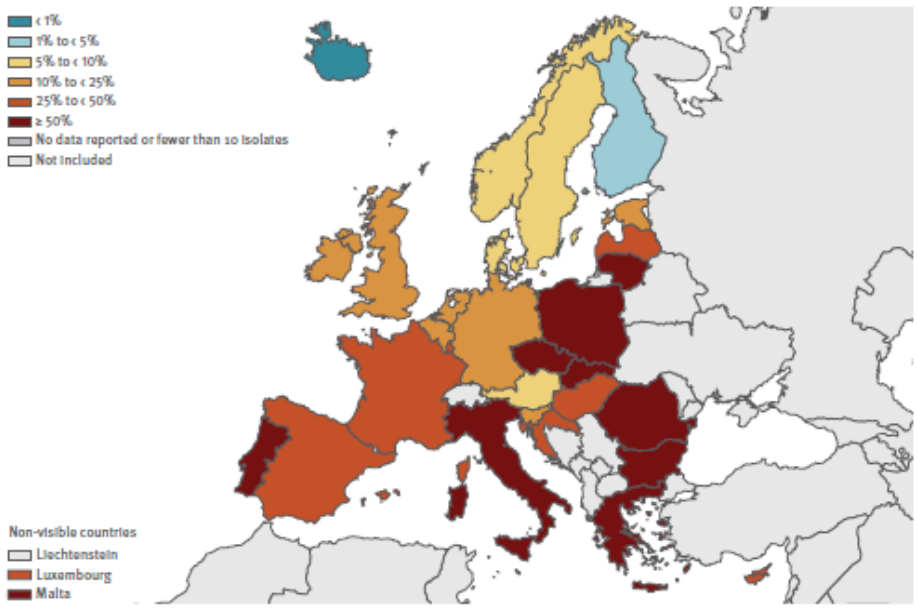


EARS report Nov 2019

3

Figure 3.9. *Klebsiella pneumoniae*. Percentage (%) of invasive isolates with resistance to third-generation cephalosporins, by country, EU/EEA countries, 2018



Percentage of invasive isolates of K.pneumoniae with resistance to 3GC

EARS report Nov 2019

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Results of the ECDC point prevalence studies 2016/17

SURVEILLANCE AND OUTBREAK REPORT

Prevalence of healthcare-associated infections, estimated incidence and composite antimicrobial resistance index in acute care hospitals and long-term care facilities: results from two European point prevalence surveys, 2016 to 2017

Carl Suetens[1], Katrien Latour[2], Tommi Kärki[1], Enrico Ricchizzi[3], Pete Kinross[1], Maria Luisa Moro[3], Béatrice Jans[2], Susan Hopkins[4], Sonja Hansen[5], Outi Lyytikäinen[6], Jacqui Reilly[7,8], Aleksander Deptula[9], Walter Zingg[10], Diamantis Plachouras[1], Dominique L Monnet[1], the Healthcare-Associated Infections Prevalence Study Group[11]

Suetens et al. Eurosurv 2018; 23: 46, 15 Nov

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ECDC SURVEILLANCE REPORT

Point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals

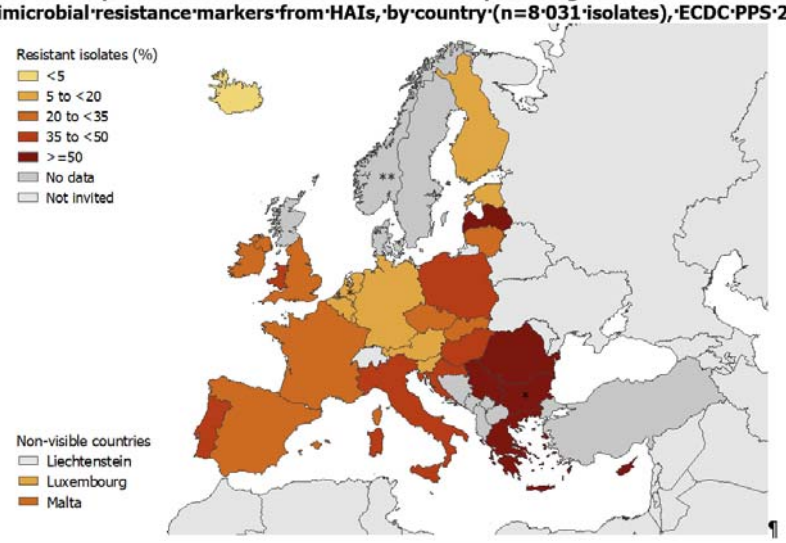
2016–2017

Will be published soon

6

Composite index of antimicrobial resistance

▪ Figure 40 Composite index of antimicrobial resistance: percentage of isolates resistant to first-level antimicrobial resistance markers from HAIs, by country (n=8 031 isolates), ECDC PPS 2016–2017¶



Composite index of antimicrobial resistance: *MRSA, VRE, Enterobacteriaceae resistant to 3rd gen. cephalosporins,* Pseudomonas aeruginosa *and* Acinetobacter baumannii *resistant to carbapenems*

Courtesy Carl Suetens, preliminary ECDC PPS report 2016/2017

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RESEARCH

National point prevalence survey on healthcare-associated infections in acute care hospitals, Switzerland, 2017

Walter Zingg[1,2], Aliki Metsini[1,2], Carlo Balmelli[3], Dionysios Neofytos[1], Michael Behnke[4], Céline Gardiol[5], Andreas Widmer[6], Didier Pittet[1], on behalf of the Swissnoso Network[7]

1. Infection Control Programme and WHO Collaborating Centre on Patient Safety, University of Geneva Hospitals and Faculty of Medicine, Geneva, Switzerland
2. These authors contributed equally
3. Infection Control Programme, Cantonal Hospital Authority, Ticino, Switzerland
4. Institute of Hygiene and Environmental Medicine, Charité University Medicine Berlin, Berlin, Germany
5. Swiss Federal Office of Public Health, Bern, Switzerland
6. Division of Infectious Diseases and Hospital Epidemiology, University Hospital Basel, Switzerland
7. Members of the Swissnoso Network are acknowledged at the end of this article

Correspondence: Walter Zingg (walter.zingg@hcuge.ch)

Zing et al. Euro Surveill 2019; 24(32):pii=1800603

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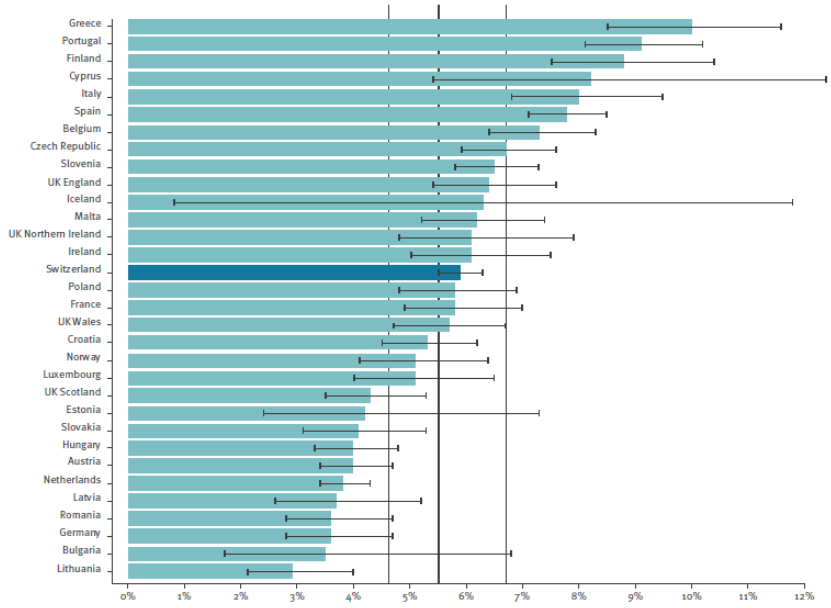
FIGURE 5

Prevalence of patients with healthcare-associated infections in the Swiss and the ECDC point prevalence surveys combined



97 hospitals participated (79% of all hospitals >100 beds)

(overrepresentation of larger hospitals?)

Zing et al. Euro Surveill 2019; 24(32):pii=1800603

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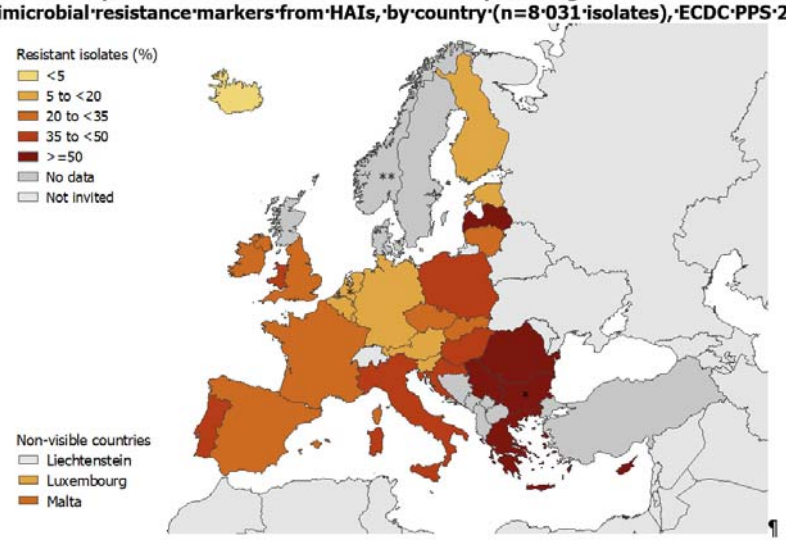
Composite index of antimicrobial resistance

▪ **Figure 40 Composite index of antimicrobial resistance: percentage of isolates resistant to first-level antimicrobial resistance markers from HAIs, by country (n=8 031 isolates), ECDC PPS 2016–2017**



Composite Index for Switzerland: 15.6%
(CI 95 12.4-18.8)

Courtesy Carl Suetens, preliminary ECDC PPS report 2016/2017

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Research

BMJ Global Health

Tracking global trends in the effectiveness of antibiotic therapy using the Drug Resistance Index

Eili Y Klein,[1,2] Katie K Tseng,[3] Suraj Pant,[3] Ramanan Laxminarayan[3]

The Drug Resistance Index (DRI) which combines use and resistance into a single measure

Klein et al. BMJ Global Health 2019; 4:e001315

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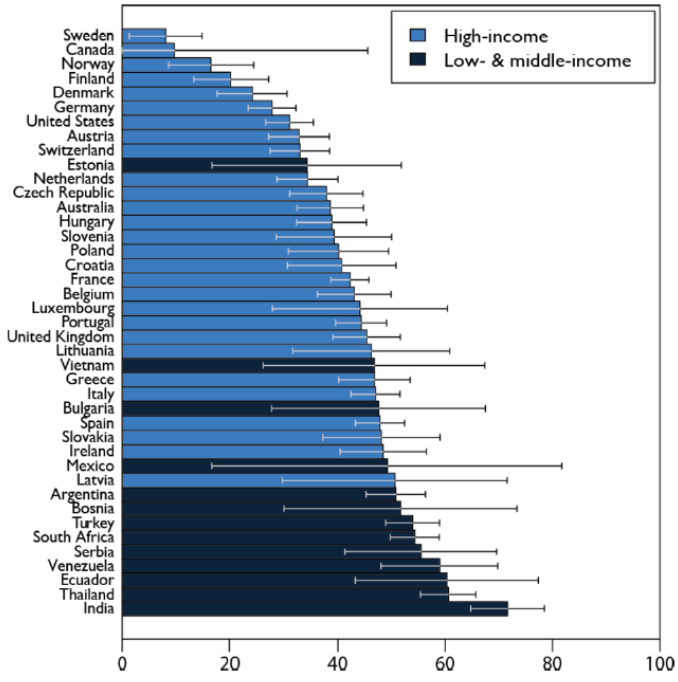

Drug Resistance Index across countries

Figure 2 Drug Resistance Index (DRI) across countries. Each bar reports the DRI for countries reporting antibiotic resistance for 5 or more pathogens and for 15 or more pathogen–antibiotic combinations for at least 1 year between 2012 and 2015. Data for the most recent year are shown. All countries included had resistance data for all seven antibiotic classes except Vietnam, which did not have resistance data for glycopeptides. Country income classifications were based on World Bank analytical classifications for fiscal year 2015.

Klein et al. BMJ Global Health 2019; 4:e001315

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Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European Economic Area in 2015: a population-level modelling analysis

*Alessandro Cassini, Liselotte Diaz Högberg, Diamantis Plachouras, Annalisa Quattrocchi, Ana Hoxha, Gunnar Skov Simonsen, Mélanie Colomb-Cotinat, Mirjam E Kretzschmar, Brecht Devleesschauwer, Michele Cecchini, Driss Ait Ouakrim, Tiago Cravo Oliveira, Marc J Struelens, Carl Suetens, Dominique L Monnet, and the Burden of AMR Collaborative Group**

Cassini et al. Lancet Infect Dis 2018

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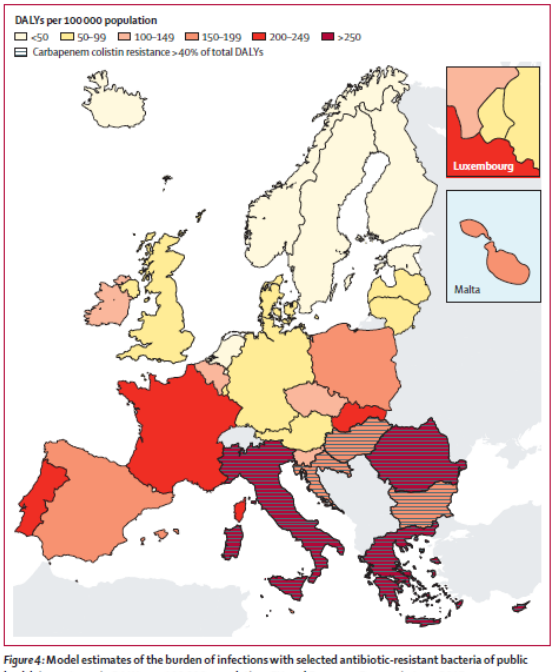

Figure 4: Model estimates of the burden of infections with selected antibiotic-resistant bacteria of public health importance in DALYs per 100 000 population, EU and European Economic Area, 2015

Model estimates of the burden of infections with selected AB resistant bacteria per 100 000 popualtion (DALYs)

DALY= Disability-adjusted life years

Cassini et al. Lancet Infect Dis 2019;19:56-66

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Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in Switzerland

On the basis of data from the European Antimicrobial Resistance Surveillance Network and the European Centre for Disease Prevention and Control (ECDC) point prevalence survey (PPS) of health-care-associated infections and antimicrobial use in 2011–12,[1] Alessandro Cassini and colleagues[2] 3·28 (95% UI 3·10–3·47) attributable deaths per 100 000, and 87·8 (95% UI 83·9–92·0) DALYs per 100 000 (table).

The number of DALYs per 100 000 in Switzerland was lower than the EU or EAA average of 170·1 (95% UI 149·5–192·4) and, compared with individual EU or EEA countries,[2] Switzerland ranked between the UK (79·9, 95% UI 70·2–90·1) and Spain (105·1, 95% UI 92·3–119·3).

In 2015, in Switzerland, the highest proportion of the total burden of disease due to infections with antibiotic-resistant bacteria (49·1 [55·9%, 95% UI 52·5–59·8] of 87·8) was caused by third-generation cephalosporin-resistant *Escherichia coli* and *Klebsiella pneumoniae*. Infections with carbapenem-resistant or colistin-resistant *E coli*, *K pneumoniae*, *Acinetobacter* spp, and *Pseudomonas aeruginosa* contributed to 20·8 (23·7%, 95% UI 21·0–26·6) of the total burden of 87·8 DALYs per 100 000, which was lower than the EU or EEA average of 65·9 (38·7%, 32·9–45·1) of 170·1 DALYs per 100 000.

The methodology developed by ECDC to estimate the burden of infections with antibiotic-resistant bacteria proved valuable for Switzerland and for benchmarking with other European countries. We conclude that other

Published Online
November 15, 2018
http://dx.doi.org/10.1016/S1473-3099(18)30708-4

This online publication has been corrected. The corrected version first appeared at thelancet.com/infection December 19, 2018

For the **Swiss Centre for Antibiotic Resistance** see http://www.anresis.ch

Gasser et al. Lancet Infect Dis 2019; 19: 17-18

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Method

- Using the data from the Swiss PPS 2017
- Same method applied as in the Cassini paper (based on the EU PPS 2011/12 data)
- Endpoints:
  - attributable deaths and
  - Disability adjusted life years (DALY) caused by infections with antibiotic resistant bacteria

Gasser et al. Lancet Infect Dis 2019; 19: 17-18

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Results:

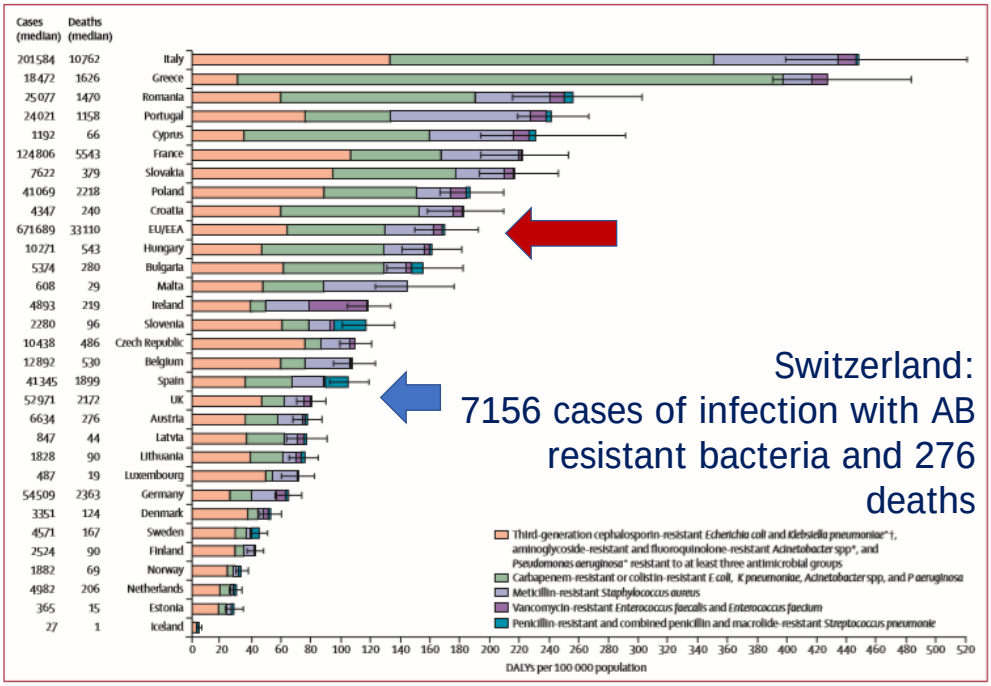
Per year:

- 7156 cases of infection with AB resistant bacteria (uncertainty interval 6825-7488)
- 276 attributable deaths (uncertainty interval 261-292)
- 7400 DALYs

Per 100 000 inhabitants:

- 85 infections
- 3.28 attributable deaths
- 87.8 DALY

17



Switzerland:
7156 cases of infection with AB resistant bacteria and 276 deaths

Cassini et al. Lancet Infect Dis 2018

Gasser et al. Lancet Infect Dis 2019; 19: 17-18

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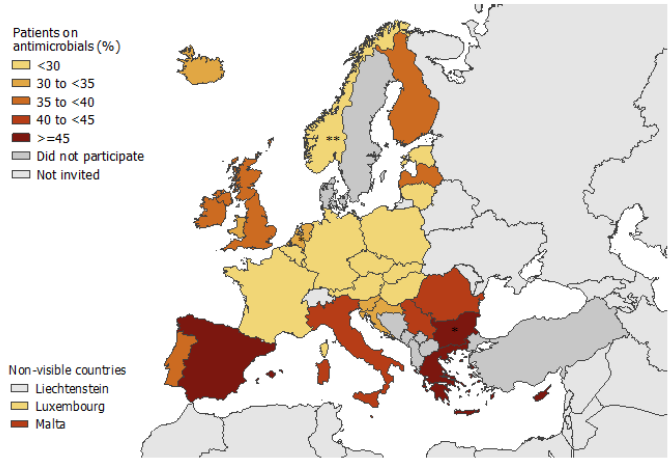
Antibiotic usage in hospitals during EU PPS 2016/17

Figure 51 Prevalence of antimicrobial use (percentage of patients receiving antimicrobials) in acute care hospitals, ECDC PPS 2016–2017



**PPS data representativeness was poor in Bulgaria and the Netherlands. **Norway used a national PPS protocol*

Courtesy Carl Suetens, preliminary ECDC PPS report 2016/2017

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RESEARCH

Antimicrobial use in acute care hospitals: national point prevalence survey on healthcare-associated infections and antimicrobial use, Switzerland, 2017

Walter Zingg[1,2], Aliki Metsini[1], Céline Gardiol[3], Carlo Balmelli[4], Michael Behnke[5], Nicolas Troillet[6], Andreas Widmer[7], Didier Pittet[1], on behalf of the Swissnoso Network[8]

1. Infection Control Programme and WHO Collaborating Centre on Patient Safety, University of Geneva Hospitals, Geneva, Switzerland
2. Imperial College London, London, United Kingdom
3. Swiss Federal Office of Public Health, Bern, Switzerland
4. Infection Control Programme, Cantonal Hospital Authority, Ticino, Switzerland
5. Institute of Hygiene and Environmental Medicine, Charité University Medicine Berlin, Berlin, Germany
6. Department of Infectious Diseases, Central Institute, Valais Hospital, Sion, Switzerland
7. Division of Infectious Diseases and Hospital Epidemiology, University Hospital Basel, Basel, Switzerland
8. Members of the network are acknowledged at the end of the article

Correspondence: Walter Zingg (walter.zingg@hcuge.ch)

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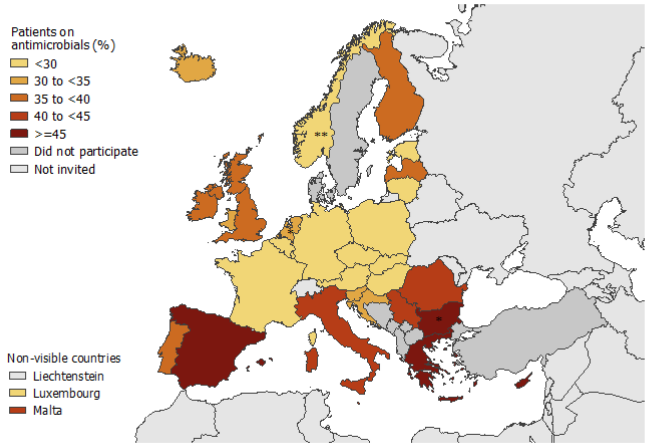
Antibiotic usage in hospitals during EU PPS 2016/17

Figure 51 Prevalence of antimicrobial use (percentage of patients receiving antimicrobials) in acute care hospitals, ECDC PPS 2016–2017



*PPS data representativeness was poor in Bulgaria and the Netherlands. **Norway used a national PPS protocol

Patients on antimicrobials in Switzerland:
33%
(CI95 32.2%-33.8%)

Courtesy Carl Suetens, preliminary ECDC PPS report 2016/2017

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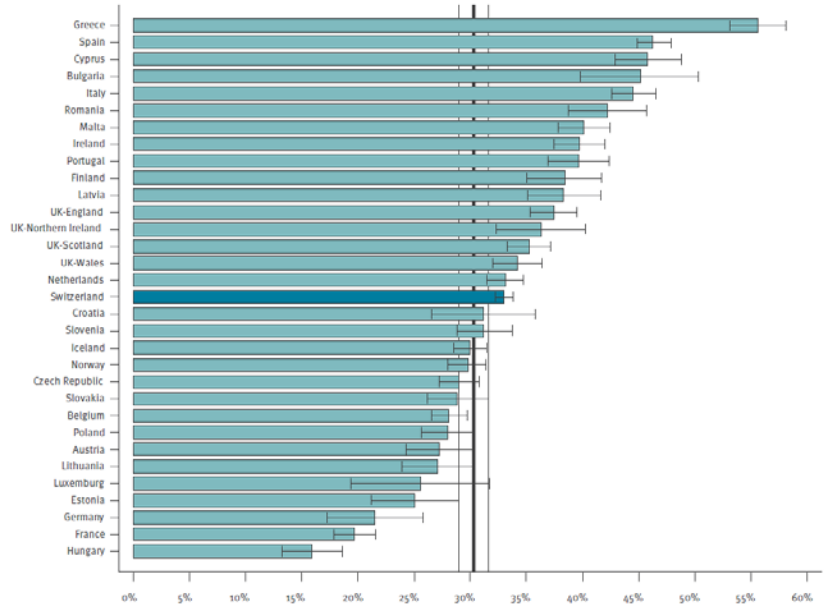
FIGURE 3
Prevalence of antimicrobial use in the Swiss and the ECDC point prevalence surveys combined



Cave: participating hospitals in Switzerland were not representative

Zingg et al. Euro Surveill 2019; 24 (33): pii=19000015

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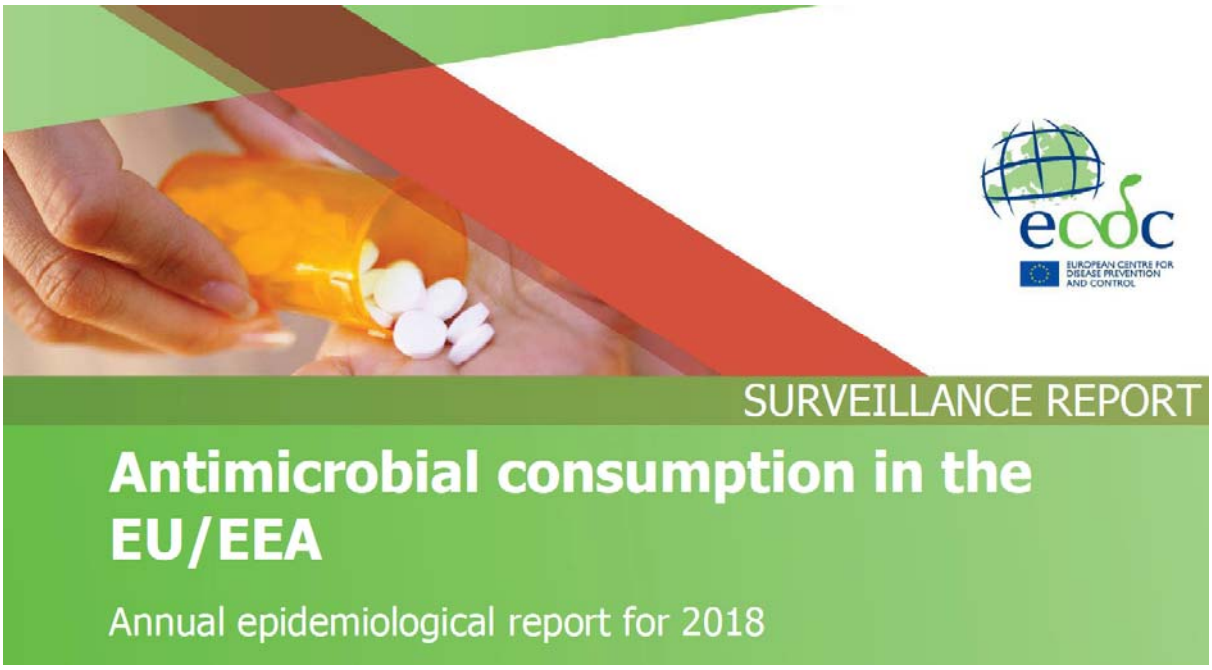

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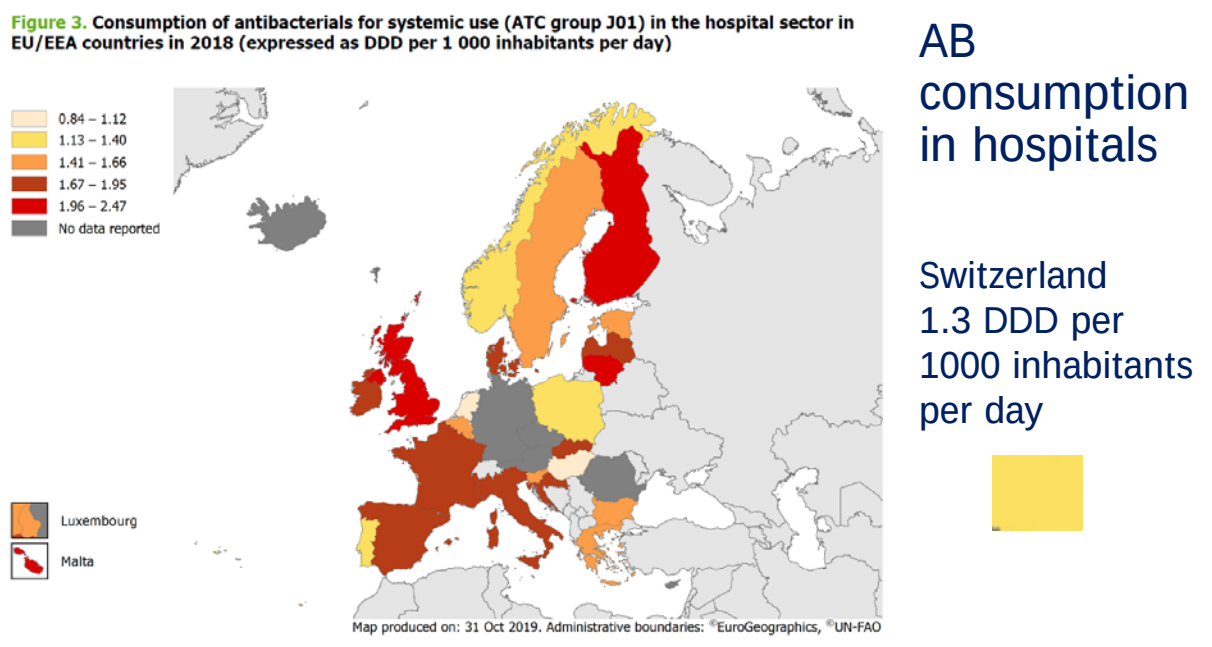

ESAC report 2019

AB consumption in hospitals

Switzerland
1.3 DDD per 1000 inhabitants per day

Faktenblatt StAR 2018

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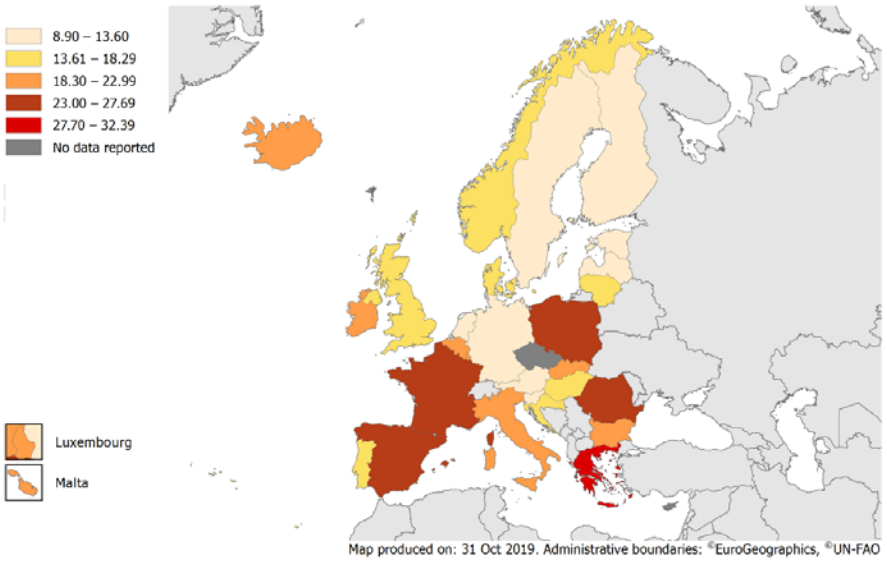
Figure 1. Consumption of antibacterials for systemic use (ATC group J01) in the community in EU/EEA countries in 2018 (expressed as DDD per 1 000 inhabitants per day)



AB consumption in the community

ESAC report 2019

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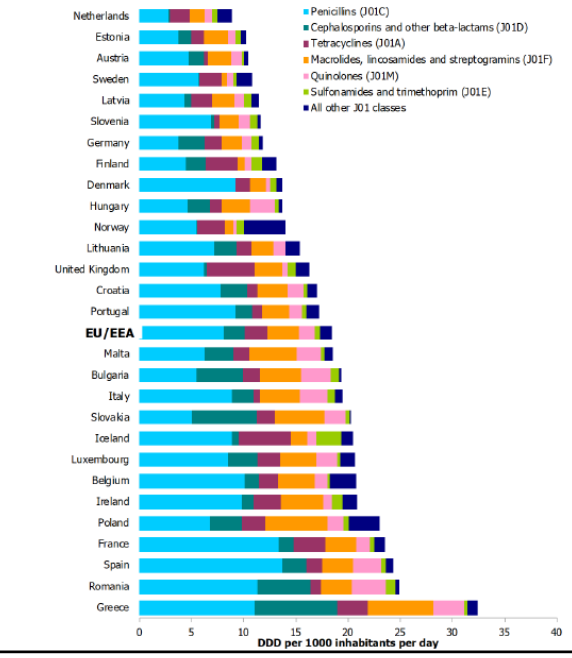
Figure 2. Consumption of antibacterials for systemic use (ATC group J01) by country and ATC group level 3 in the community in EU/EEA countries in 2018 (expressed as DDD per 1 000 inhabitants per day)



Switzerland 10.7 DDD per 1000 inhabitants

Faktenblatt StAR 2018

AB consumption in the community

ESAC report 2019

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Summarizing resistance rates in Switzerland

Study	Value	Position in Europe (1.= best)
National Prevalence study 2016/17 (Composite index)	15.6 %	7.
Drug resistance index (Klein et al. method)	Only in the figure	7.
Burden of resistance (Cassini et al. method)	85 infections per 100 000 people, 3.28 attributable deaths per 100 000 people and 87.8 DALY per 100 000 people	13.

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Summary antibiotic usage rates in Switzerland

Study	Value	Position in Europe (1.= best)
National prevalence study	33%	16.
ECDC reports		
- hospital	1.3 per 1000 inhabitants per day ?	3.
- community	10.7 per 1000 inhabitants per day	4.

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Is there still room for improvement?

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Example 1

J Antimicrob Chemother 2017; **72**: 3205–3212
doi:10.1093/jac/dkx278 Advance Access publication 24 August 2017

Journal of Antimicrobial Chemotherapy

Quality of antibiotic prescribing of Swiss primary care physicians with high prescription rates: a nationwide survey

Dominik Glinz[1], Selene Leon Reyes[1], Ramon Saccilotto[1], Andreas F. Widmer[2], Andreas Zeller[1,3], Heiner C. Bucher[1]* and Lars G. Hemkens[1]

[1]Basel Institute for Clinical Epidemiology and Biostatistics, University Hospital Basel, and University of Basel, Basel, Switzerland; [2]Division of Infectious Diseases and Hospital Hygiene, University Hospital Basel, and University of Basel, Basel, Switzerland; [3]Centre for Primary Health Care, University of Basel, Basel, Switzerland

Glinz et al. JAC 2017; 72:3205-12

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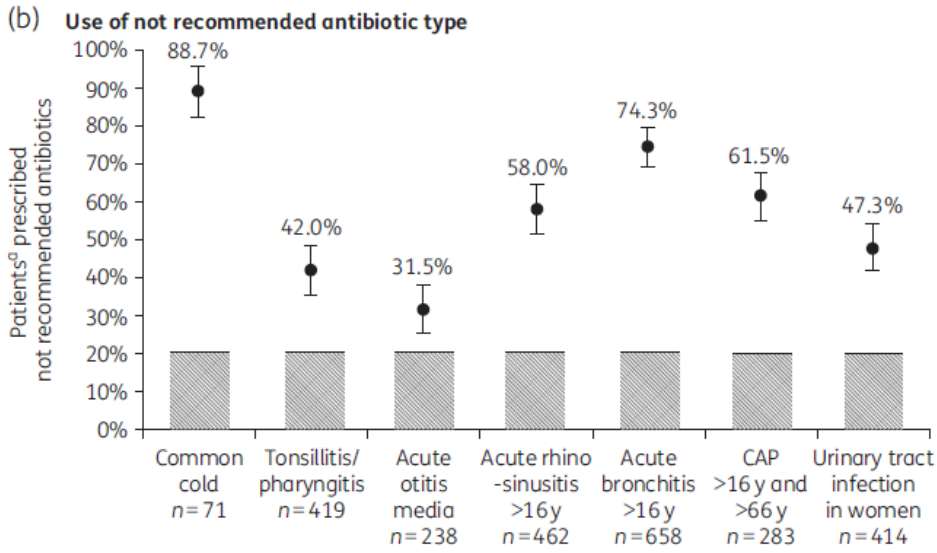
Use of not recommended antibiotic type



Glinz et al. JAC 2017; 72:3205-12

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Example 2

JAMA Internal Medicine | Original Investigation

Personalized Prescription Feedback Using Routinely Collected Data to Reduce Antibiotic Use in Primary Care
A Randomized Clinical Trial

Lars G. Hemkens, MD, MPH; Ramon Saccilotto, MD; Selene Leon Reyes, PhD; Dominik Glinz, PhD, MSc; Thomas Zumbrunn, PhD; Oliver Grolimund; Viktoria Gloy, PhD; Heike Raatz, MD, MSc; Andreas Widmer, MD, MSc; Andreas Zeller, MD, MSc; Heiner C. Bucher, MD, MPH

Hemkens et al. JAMA Intern Med. 2017 Feb 1;177(2):176-183

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OBJECTIVE To determine if quarterly antibiotic prescription feedback over 2 years reduces antibiotic use when implemented in a complex health care system.

DESIGN, SETTING, AND PARTICIPANTS Pragmatic randomized trial using routinely collected claims data on 2900 primary care physicians with the highest antibiotic prescription rates in Switzerland.

INTERVENTIONS Physicians were randomized to quarterly updated personalized antibiotic prescription feedback over 2 years (n = 1450) or usual care (n = 1450). Feedback was provided both by mail and online from October 2013 to October 2015 and was supported by an initial 1-time provision of evidence-based guidelines.

MAIN OUTCOMES AND MEASURES The primary outcome was the prescribed defined daily doses (DDD) of any antibiotic to any patient per 100 consultations in the first year analyzed by intention-to-treat. We further analyzed prescriptions of specific antibiotics, age groups, and sex for the first and second year to investigate persistency of effects over time.

Hemkens et al. JAMA Intern Med. 2017 Feb 1;177(2):176-183

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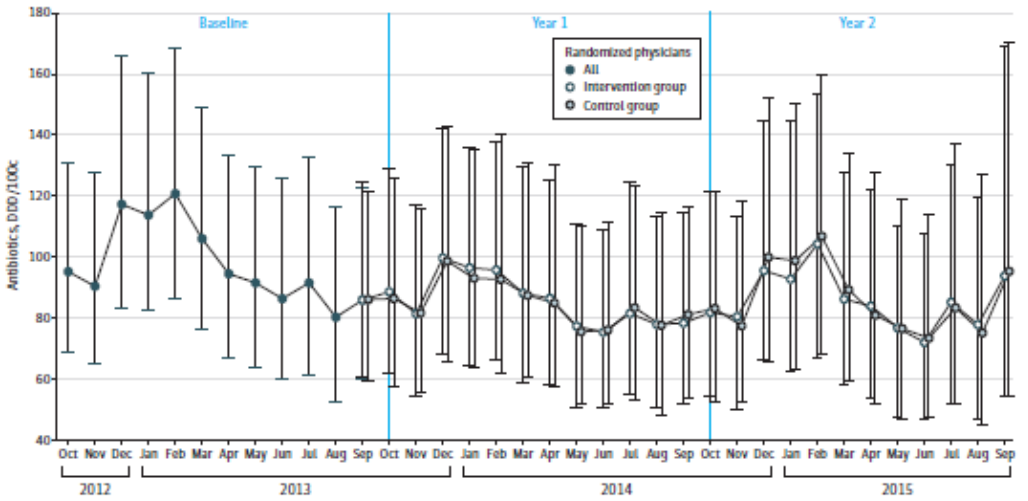
Figure 2. Monthly Prescriptions of Antibiotics (Defined Daily Doses [DDD] per 100 Consultations [100c]) in the Preintervention Period and During 2 Years of Quarterly Feedback



Hemkens et al. JAMA Intern Med. 2017 Feb 1;177(2):176-183

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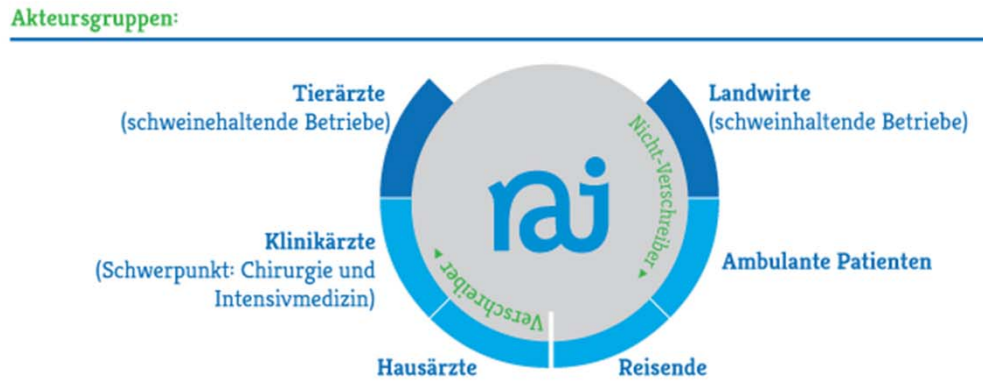
Rationaler Antibiotikaeinsatz durch Information und Kommunikation (RAI)



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Development of information tools for prescribers and patients

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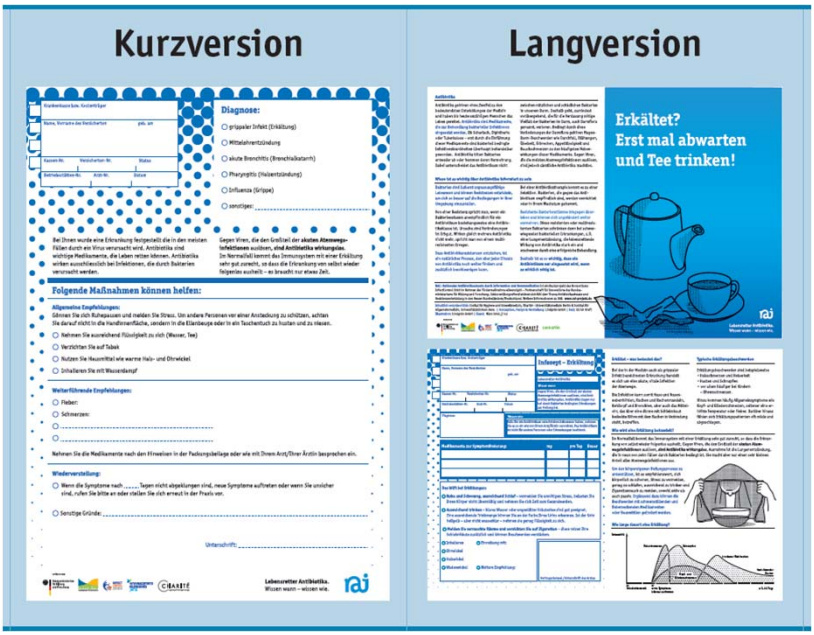
Example: „Infozepte“

Summarizing what the physicians has normally to explain to the patient



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Infozept-Generator

- Infozepte:
  - Main symptoms: 7
  - Treatment explanations: 5
  - General aspects: 3
- Languages:
  - German, Turkish, Arab, English Englisch

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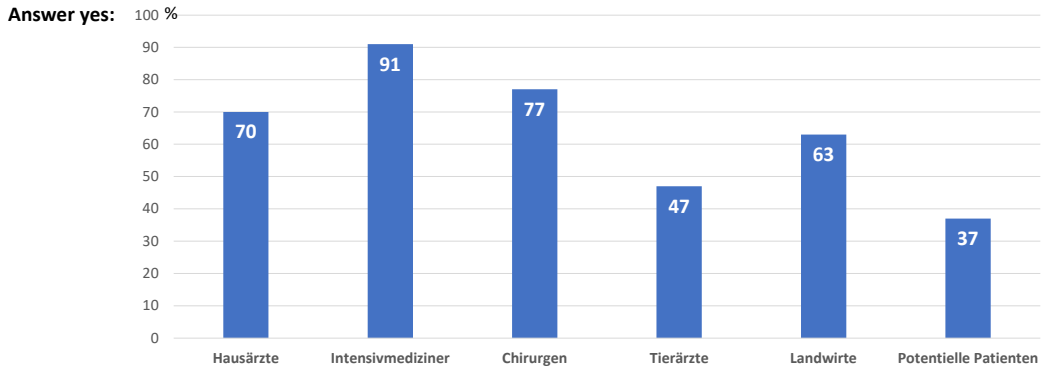
Own influence on AMR:

GPs (n= 340)	Inten-sivists (n = 109)	Surgeons (n = 60)	Vets (n = 60)	Farmers (n = 216)	Potential patients (n= 1004)

Do you believe that your own prescribing/usage habits have an influence on the AMR situation in your region?



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Barrieres

- The own influence is often underestimated
- Other fields are regarded as main approaches for improvement
- Prescriber - user communication should be improved
- Knowledge gaps

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Main approaches to prevent AMR

- Antimicrobial stewardship AMS)
- Infection prevention and control (IPC)

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European Journal of Clinical Microbiology & Infectious Diseases (2019) 38:2061–2068
https://doi.org/10.1007/s10096-019-03648-2

ORIGINAL ARTICLE

Check for updates

Organization and training at national level of antimicrobial stewardship and infection control activities in Europe: an ESCMID cross-sectional survey

Alberto Enrico Maraolo[1] · David S. Y. Ong[2,3] · Cansu Cimen[4] · Philip Howard[5] · Diamantis P. Kofteridis[6] · Jeroen Schouten[7] · Nico T. Mutters[8] · Céline Pulcini[9] · on behalf of the ESGAP-EUCIC-TAE Working Group on AMS/IPC mapping in Europe

Maraolo et al. Eu J Clin Micro Infect Dis 2019; 38: 2016-68

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Overview of guidance or requirements on AMS and IPC

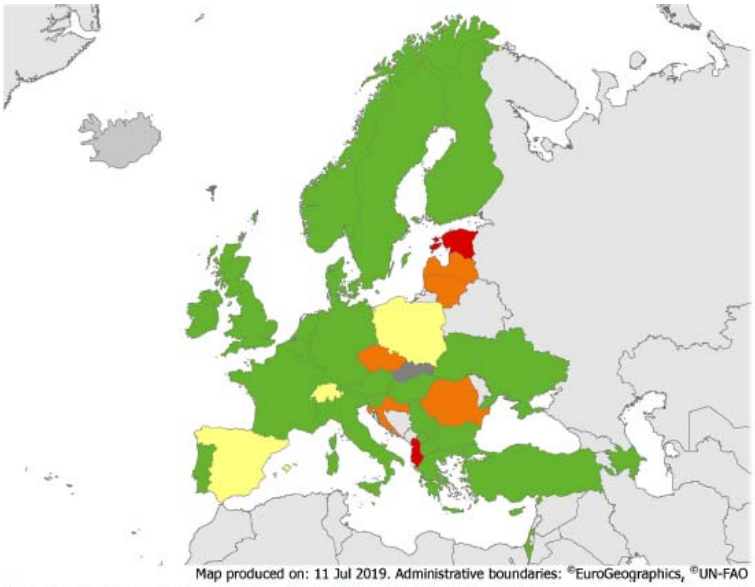

Fig. 1 Overview of guidance or requirements on AMS and IPC implementation. Green = guidance or requirements on both AMS and IPC implementation. Yellow = guidance or requirements on AMS (but not on IPC implementation). Orange = guidance or requirements on IPC (but not on AMS implementation). Red = no guidance or requirements on AMS and IPC implementation. Dark grey = no data available

Yellow = documents are available for AMS, but not for IPC

Maraolo et al. Eu J Clin Micro Infect Dis 2019; 38: 2016-68

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Overview of national staffing standards on AMR and IPC

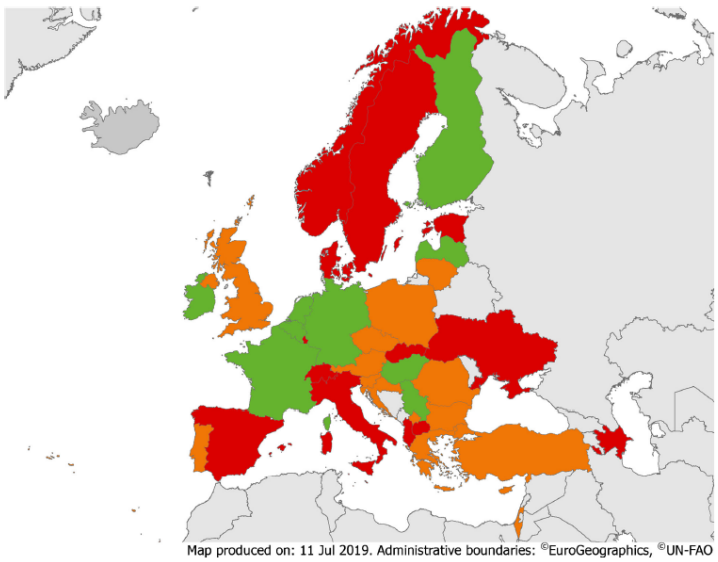

Fig. 2 Overview of national staffing standards for AMS and IPC teams. Green = staffing standards for both AMS and IPC teams. Orange = staffing standards for IPC teams (but not for AMS teams). Red = no staffing standard for AMS and IPC teams

Red = no staffing standard for AMS and IPC

Maraolo et al. Eu J Clin Micro Infect Dis 2019; 38: 2016-68

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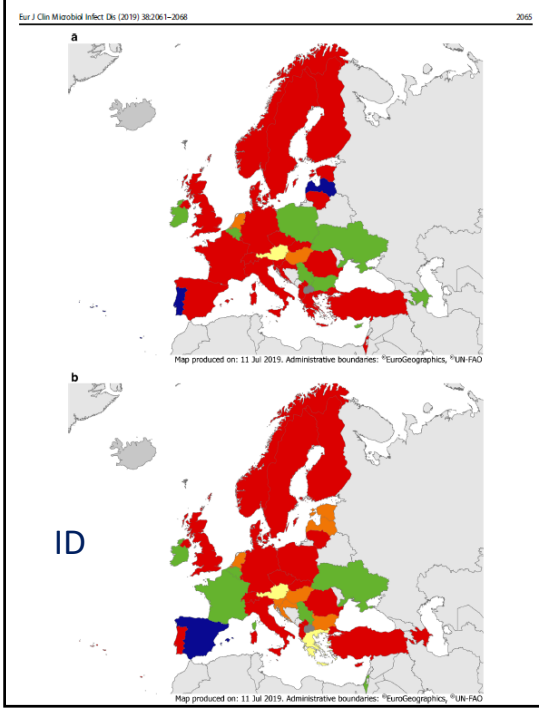

Educational requirements on AMS for CM training

Red = no mandatory formal training on AMS implementation or involvement in AMS activity during training

Educational requirements on AMS for ID training

Maraolo et al. Eu J Clin Micro Infect Dis 2019; 38: 2016-68

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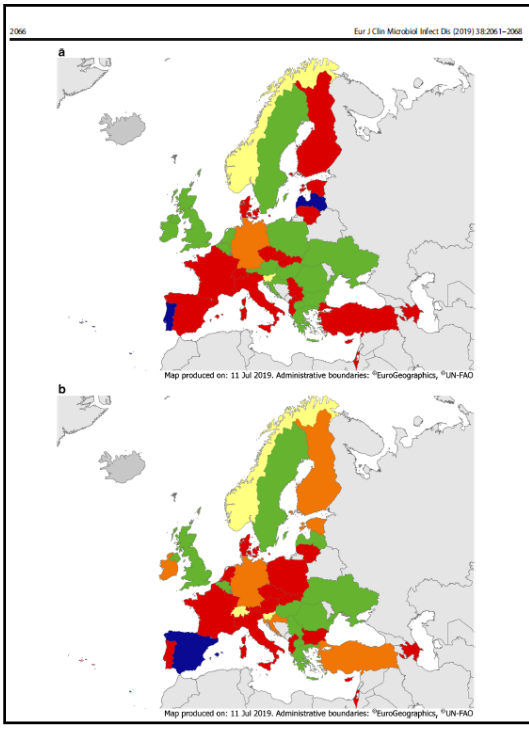

Educational requirements on IPC for CM training

Red = no mandatory formal training on IPC implementation or involvement in AMS activity during training

Educational requirements on IPC for ID training

Yellow = mandatory formal training in IPC implementation

Maraolo et al. Eu J Clin Micro Infect Dis 2019; 38: 2016-68

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Journal of Travel Medicine

International Society of Travel Medicine
Promoting healthy travel worldwide

Journal of Travel Medicine, 2019, 1–13
doi: 10.1093/jtm/taz036
Review

Review

Global geographic trends in antimicrobial resistance: the role of international travel

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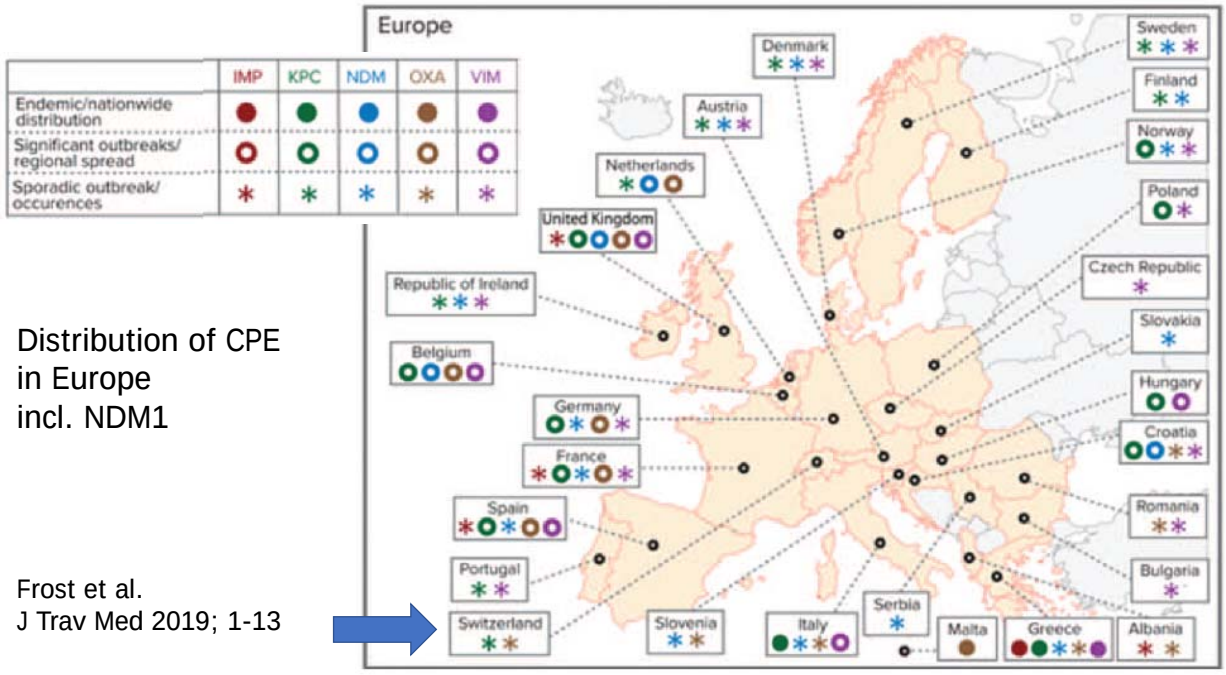

Distribution of CPE in Europe incl. NDM1

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Summary

- Compared with most other European countries the AMR situation in Switzerland is better, but there is still a substantial burden
- Switzerland also belongs to the countries with the lowest use of antibiotics in the community and in the hospital
- Switzerland should be aware of the resistance situation in the surrounding countries
- There seems to be room for improvement, e.g. structures in the field of AMR and IPC are not optimal compared to other countries.

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