

ANRESIS an update

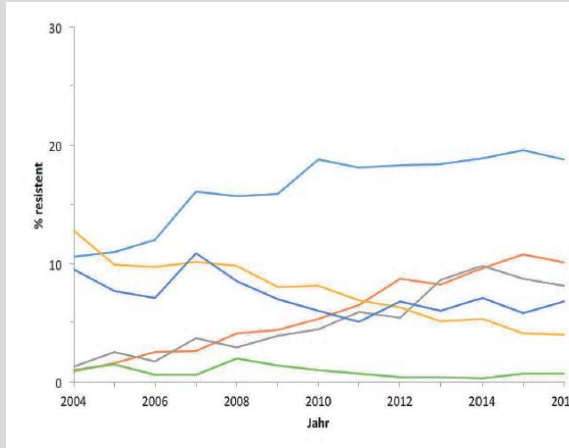
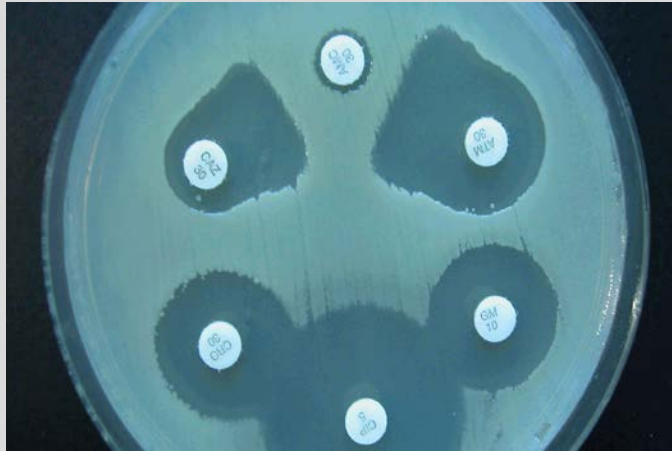
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Andreas Kronenberg

Institute for Infectious Diseases, University Bern

anresis.ch



Symposium Antibiotic Resistance StAR, 22.11.2019

- Introduction
- Trends
 - MRSA
 - Quinolone resistant *E. coli*
 - ESCR
- Carbapenemase-producing Enterobacterales (CPE)
- Vancomycin-resistant Enterococci (VRE)
- Outlook

ANRESIS

Antibiotic Resistance

30 Human / 9 VET -Labs

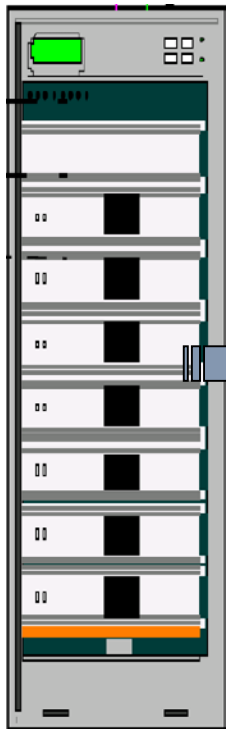
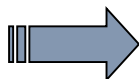
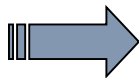
135 Hospitals

400'000 Samples / year

Antibiotikaverbrauch

1000 Pharmacies

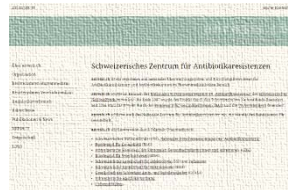
70 Hospitals



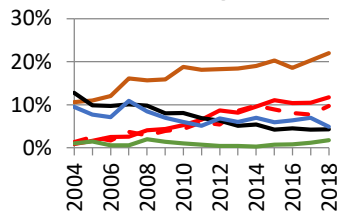
database

anresis.ch

www.anresis.ch



BAG-report



Publications



infect.info



One health



International reports





INFECT
by **anresis.ch**

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filter



Search Filters

Search filters



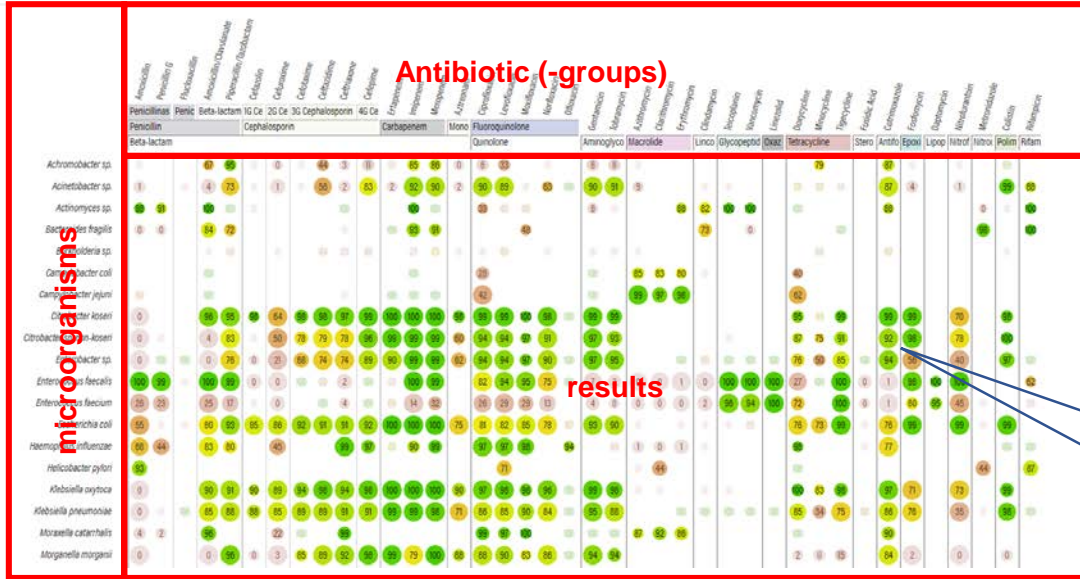
Filters for Antibiotics

Name

Please choose

Substance Class

- 1G Cephalosporin
- 2G Cephalosporin
- 3G Cephalosporin
- 4G Cephalosporin
- Aminoglycoside
- Antifolate
- Beta-lactam
- Beta-lactam + inhibitor
- Carbapenem
- Cephalosporin
- Epoxide
- Fluoroquinolone
- Glycopeptide
- Lincosamide
- Lipopeptide
- Macrolide
- Monobactam
- Nitrofuran
- Nitroimidazole
- Oxazolidinone
- Penicillin
- Penicillinoles



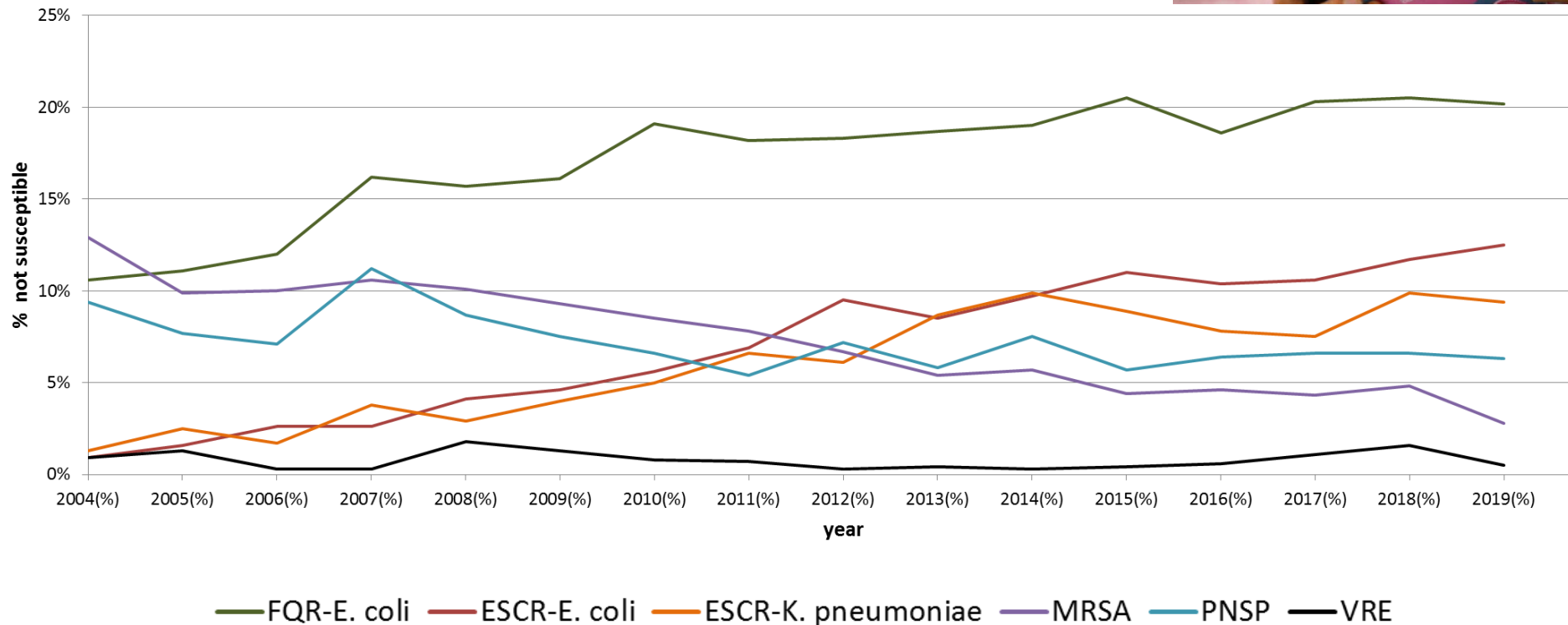
- www.infect.info
- Data last 365 days
- Monthly update
- Interactive matrix
- App (iOS / Android)



Trends 2004 - 2019



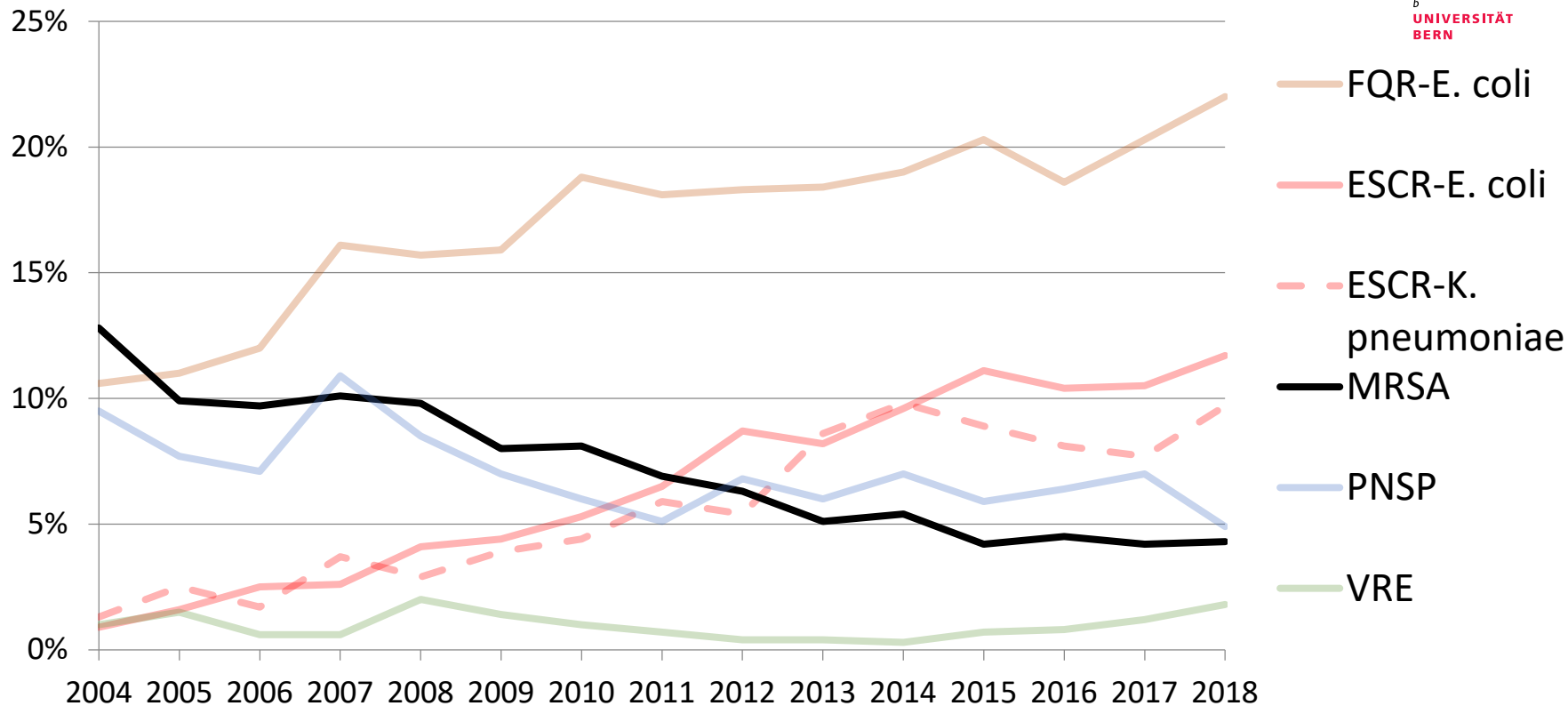
Multidrug Resistance in Switzerland (blood cultures only)



MRSA

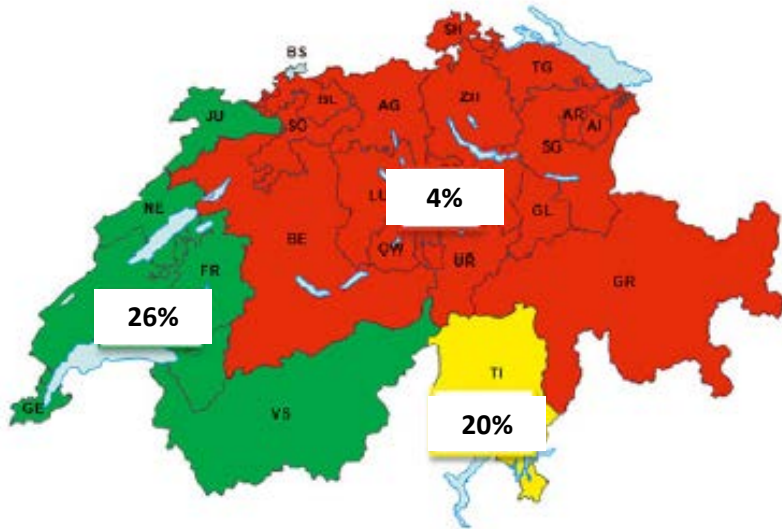
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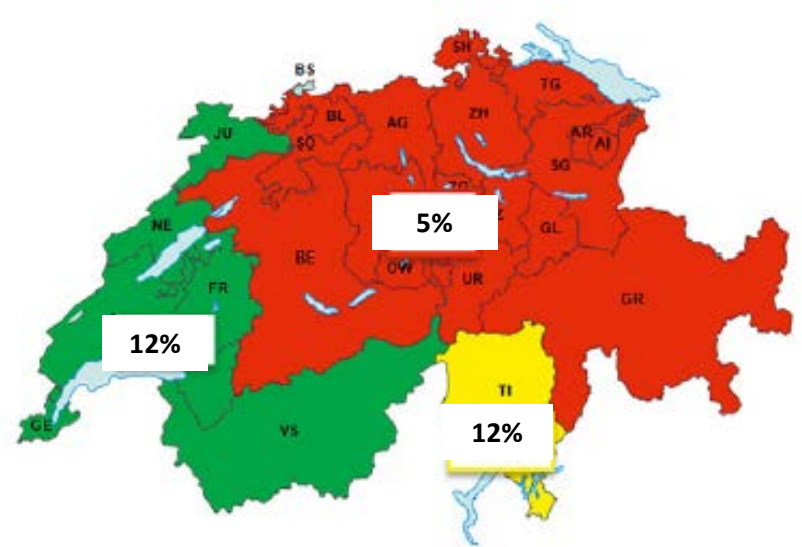


MRSA

2004

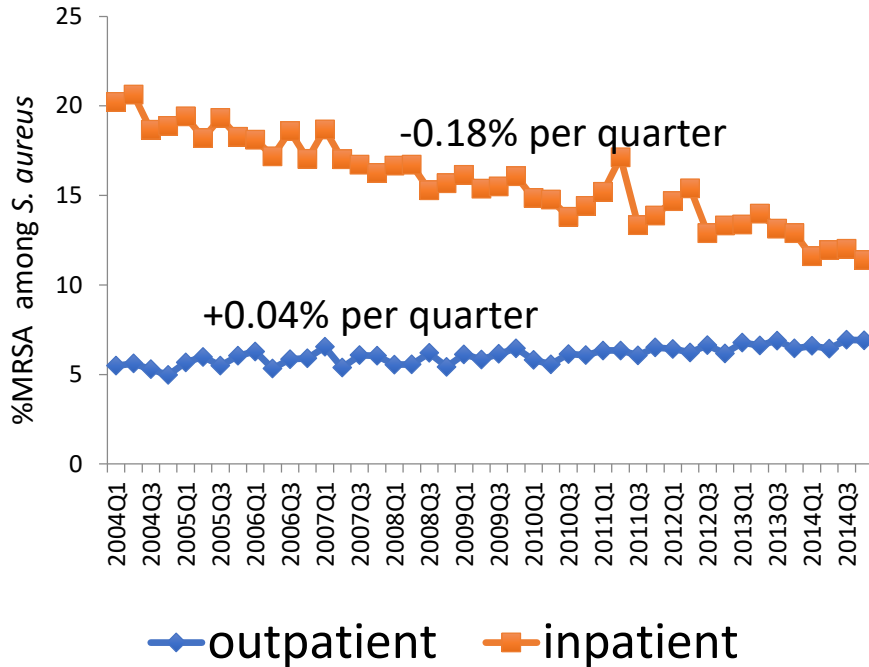


2014

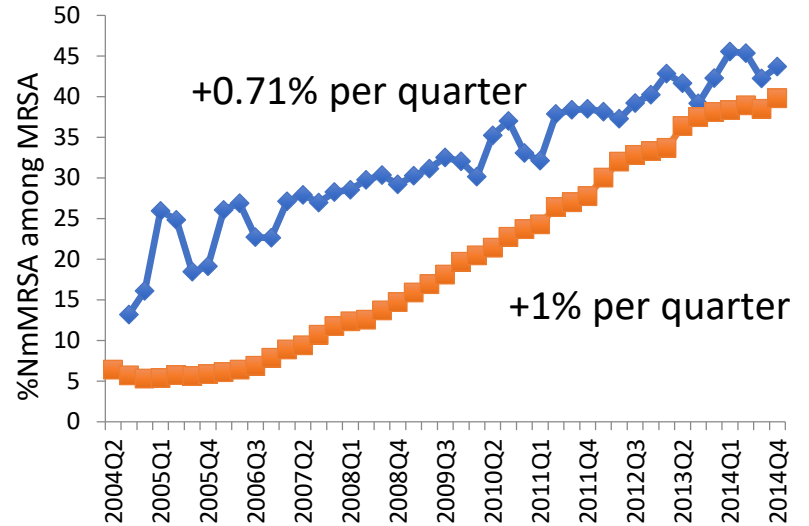


cMRSA trend Switzerland 2004 - 2014

MRSA trend (% von *S.aureus*)

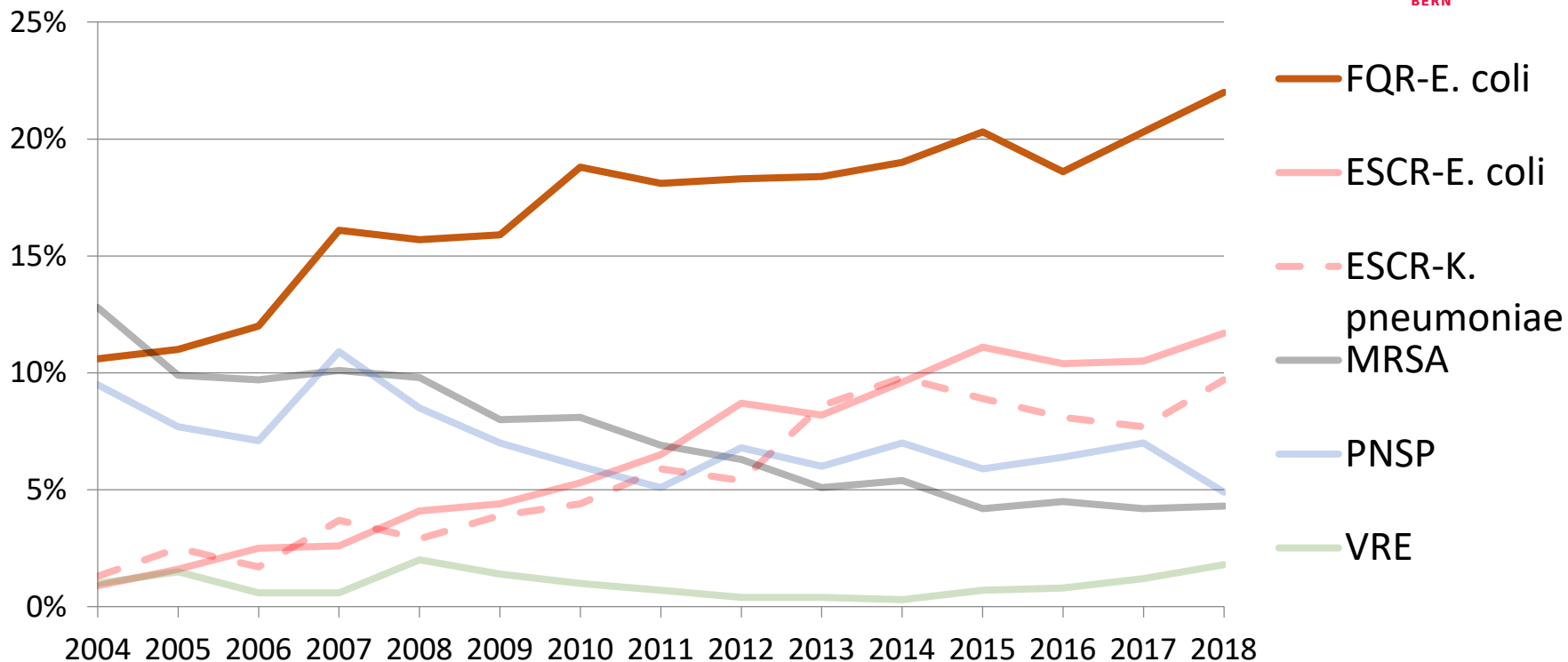


cMRSA* trend (% von MRSA)



*susceptible to ≥ 3 out of ciprofloxacin, clindamycin, tetracycline TMP/SMX

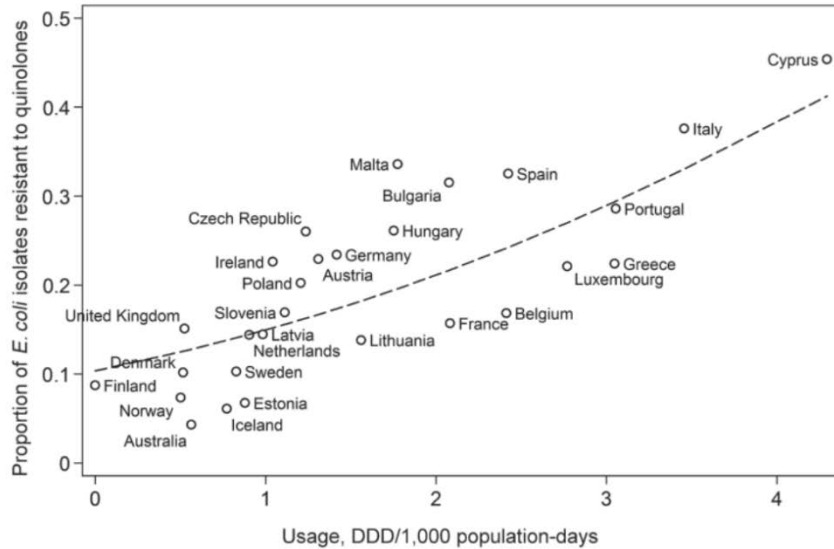
Quinolon resistance in *E. coli* (“selection“)



Correlation resistance – antibiotic use I

Quinolone use and resistance in Europe

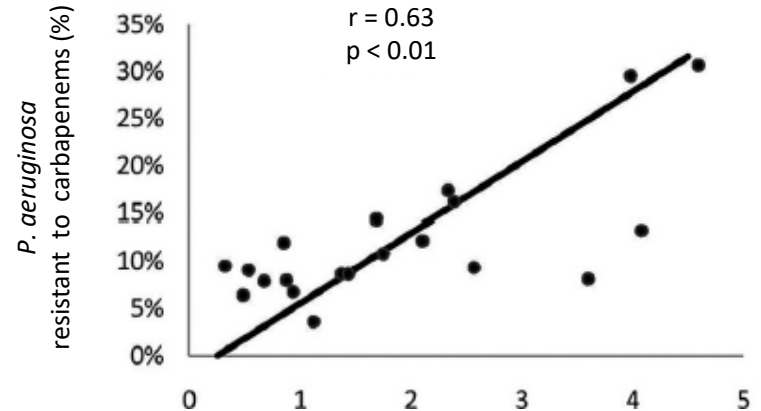
(DDD/100beddays)



Cheng AC, Eurosurveillance 2012

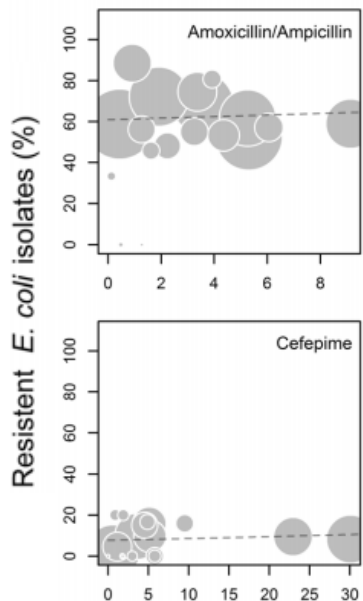
Carbapenem use and resistance in CH

(DDD/100beddays)



Plüss-Suard, Kronenberg et. al AAC 2013

Correlation r in different depa



* significant correlation

www.ssi.guidelines.ch

Richtlinie

Harnwegsinfekt (HWI)

- Einleitung
- Diagnose
- Prävention/Prophylaxe
- Zurückhaltender Antibiotika-Einsatz bei HWI
- Empirische Therapie
- Spezifische Therapie
- Quelle / Info / Autoren

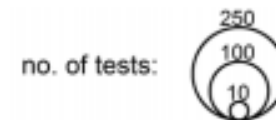
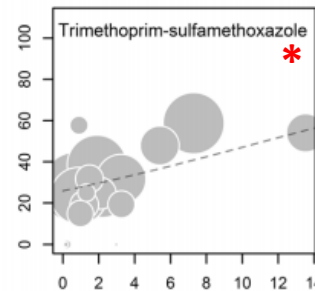
Harnwegsinfekt Unkomplizierte Zystitis

Information

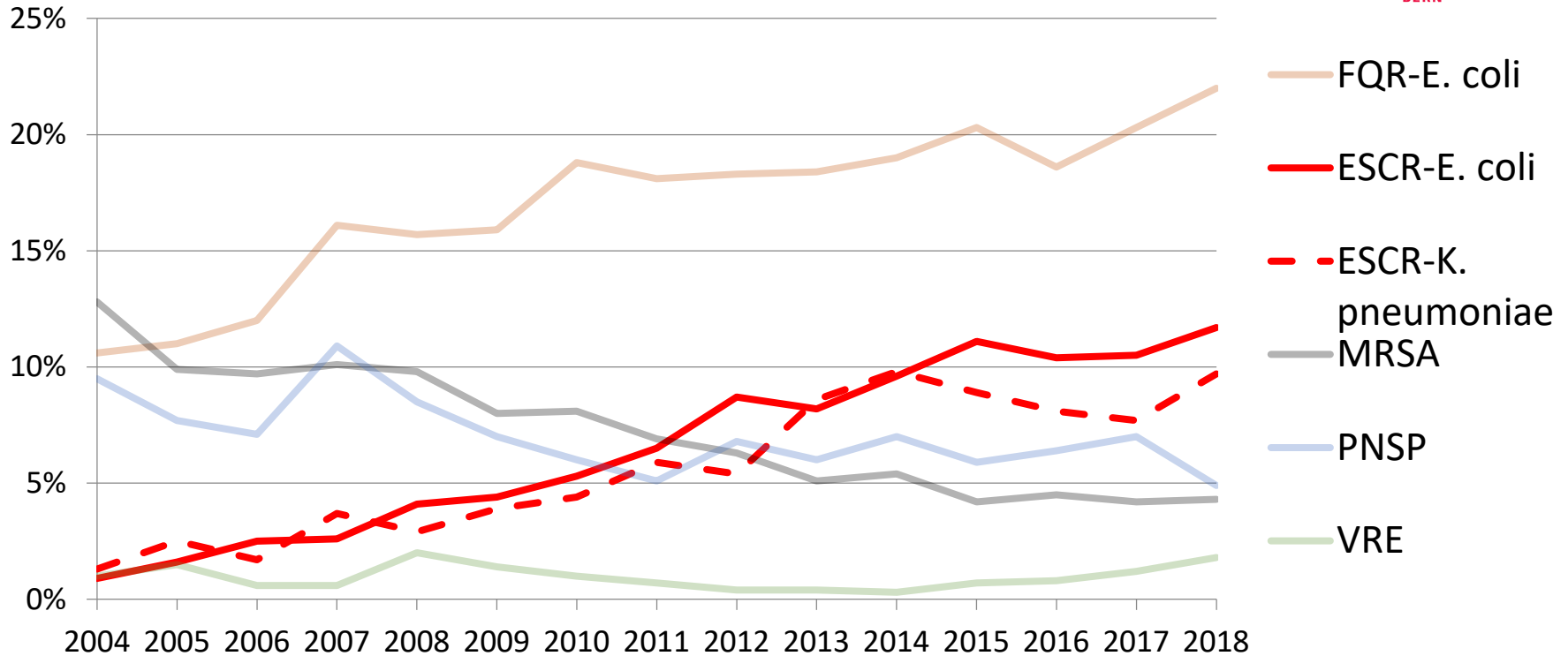
GÜLTIGKEIT	AUTOREN
Gültig seit: 15.09.2019	
Sammlung: SGInf-Guidelines (D)	
Organisation: SSI	



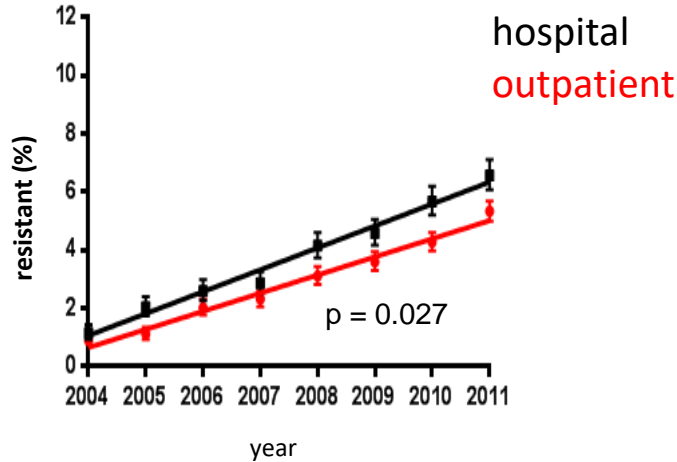
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ESC-resistance in Switzerland



ESCR in *E. coli*: Switzerland (“one health”)



Stool samples

Cattle
Pig
Chicken
Sheep

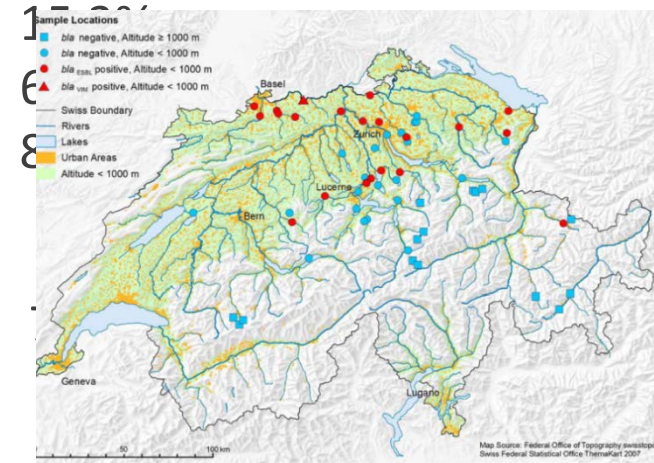
Food

Poultry (n=20)
Salad

Environment

Water samples

13.7%

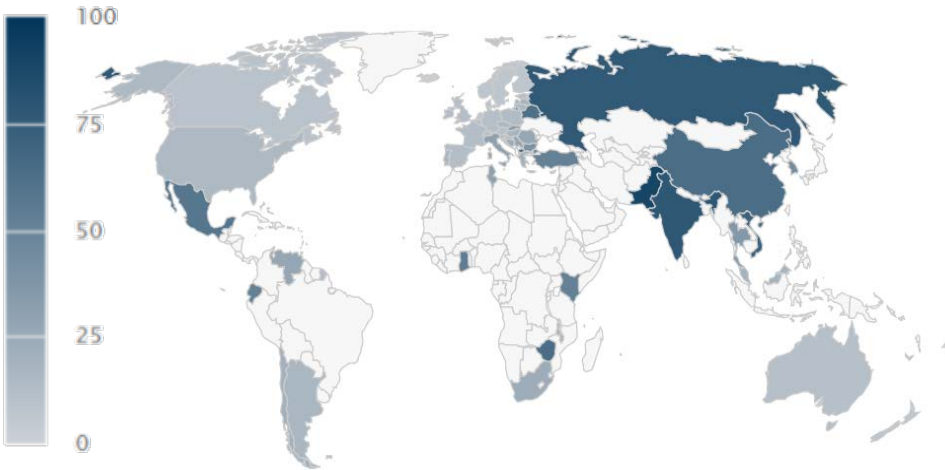


Kronenberg et al. *Eurosurveillance* 2013
Geser N et al. *BMC Vet Res* 2012
Seiffert, Endimiani et al. *AAC* 2013
Rasheed, *Rev. Inst. Med. Trop. Sao Paulo*, 2014
Zurfluh, *Appl. and Environment Microbiology* 2013

36%

ESCR in *E. coli*: world (“one world”)

ESCR in *E. coli* (world)



ESCR in tourists

Europe	0-13%
Middle East	13-29%
Northern Africa	19-40%
Central / Southern Africa	22-30%
North America	0%
South America	0-7%
Asia (excluding India)	32-38%
India	15-88%

Tängden T et al. *Antimicrobial Agents and Chemotherapy* 2010;54:3564

Paltansing S et al. *Emerging Infectious Diseases* 2013; 19:1206

Östholm-Balkhed A et al. *Journal of Antimicrobial Chemotherapy* 2012;68:2144

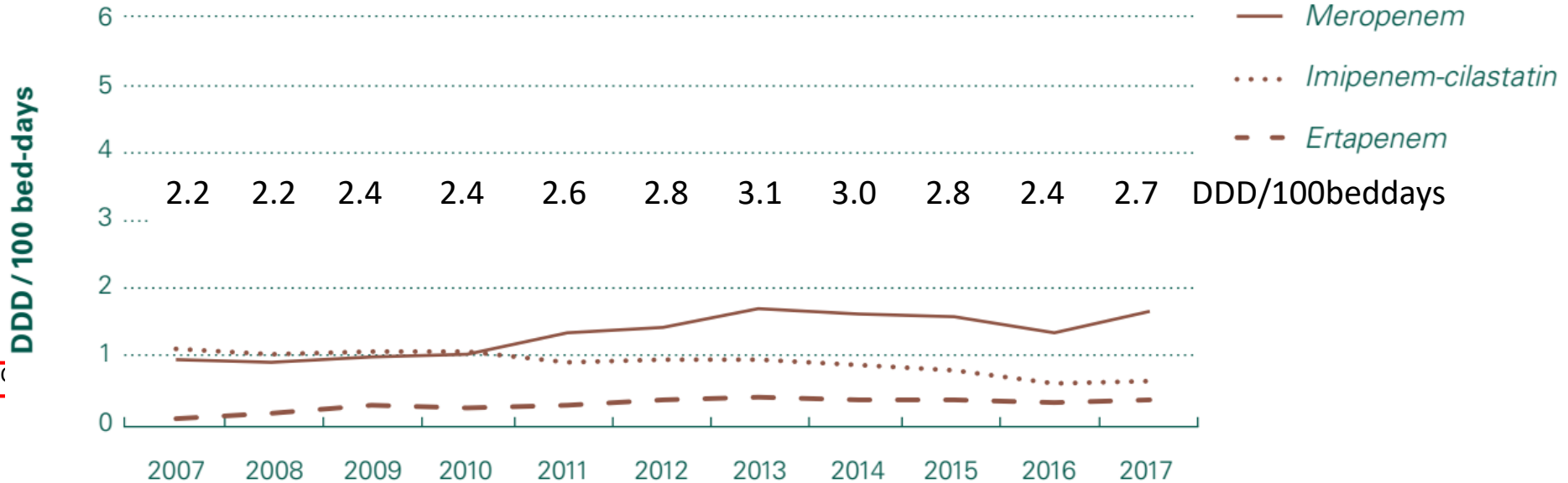
Rausch, *Travel Medicine and Infectious Diseases* 2013

Künzli E, *BMJ Infect Dis* 2014; 14:528

Increasing use of carbapenems 2000-2010

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Standard units

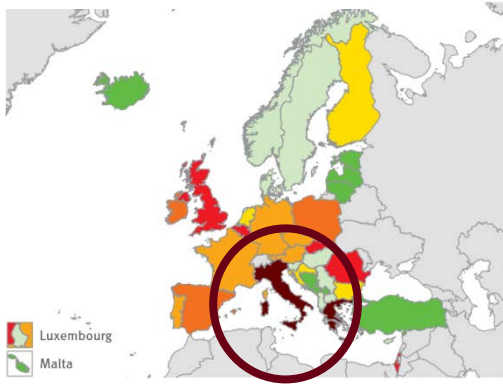
Standard units

Boeckel, Lancet Infect Dis 2014 Aug;14(8):742-50

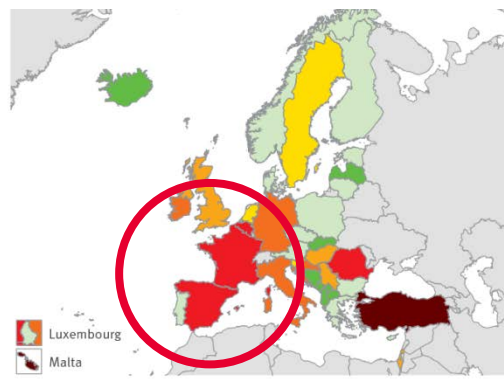
SARR 2018

Carbapenemases in Europe

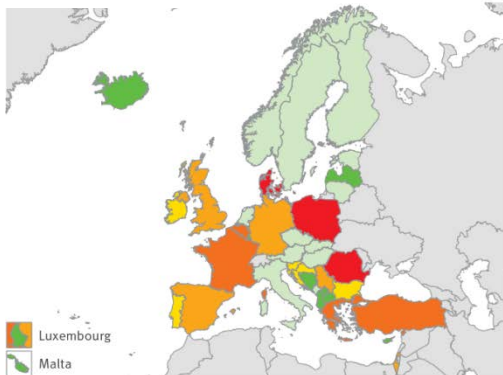
KPC



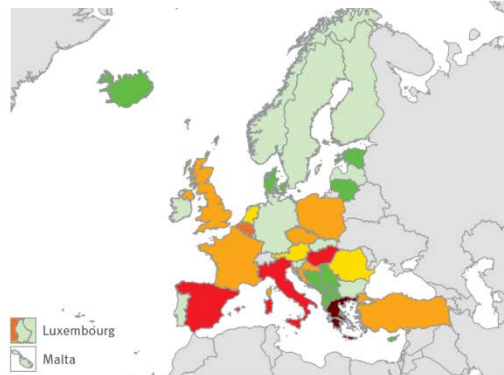
OXA-48



NDM



VIM

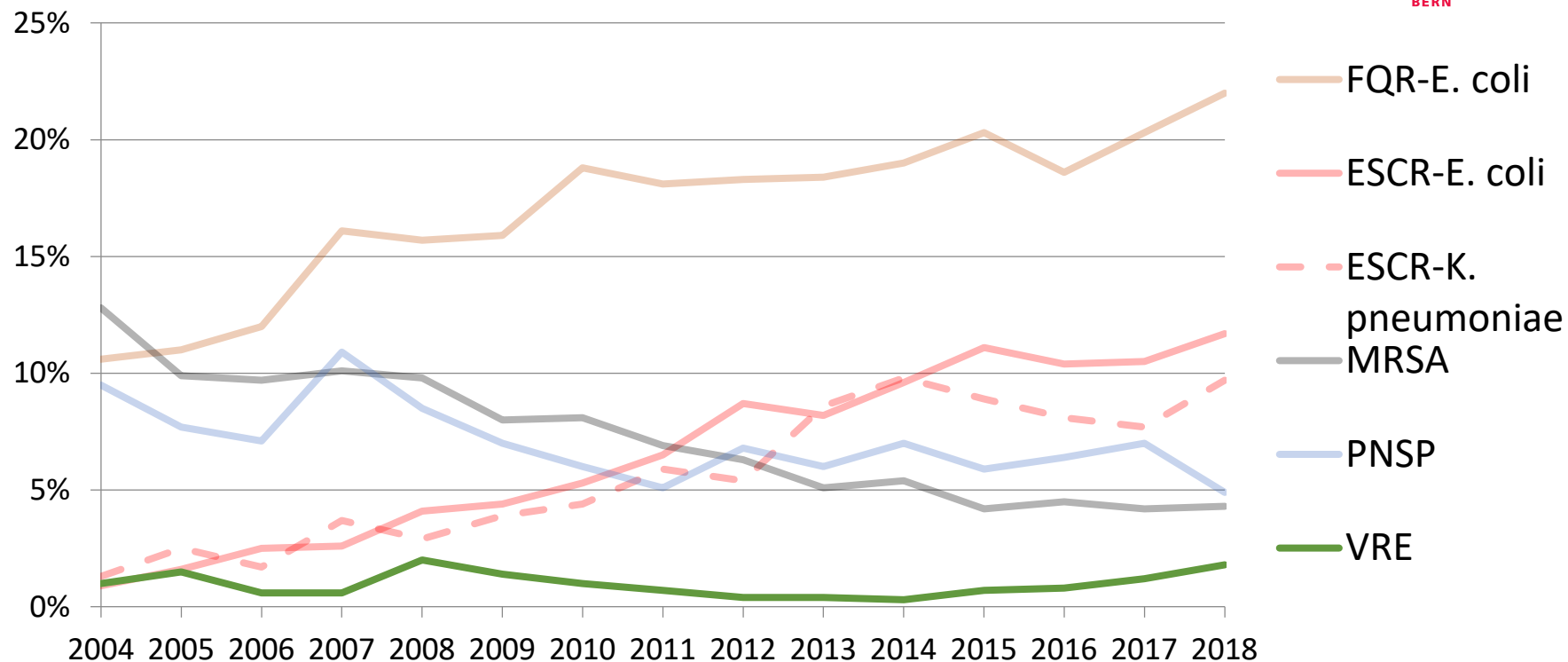


- Grey: Countries not participating
- Green: No case reported (Stage 0)
- Light Green: Sporadic occurrence (Stage 1)
- Yellow: Single hospital outbreak (Stage 2a)
- Orange: Sporadic hospital outbreaks (Stage 2b)
- Dark Orange: Regional spread (Stage 3)
- Red: Inter-regional spread (Stage 4)
- Dark Brown: Endemic situation (Stage 5)

Vancomycin resistance in Enterococci (VRE)

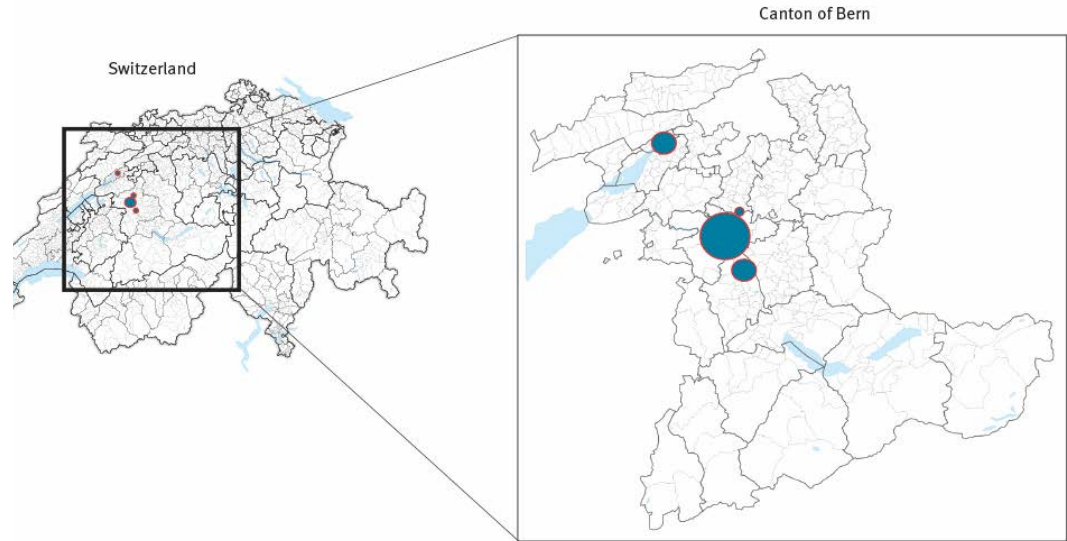
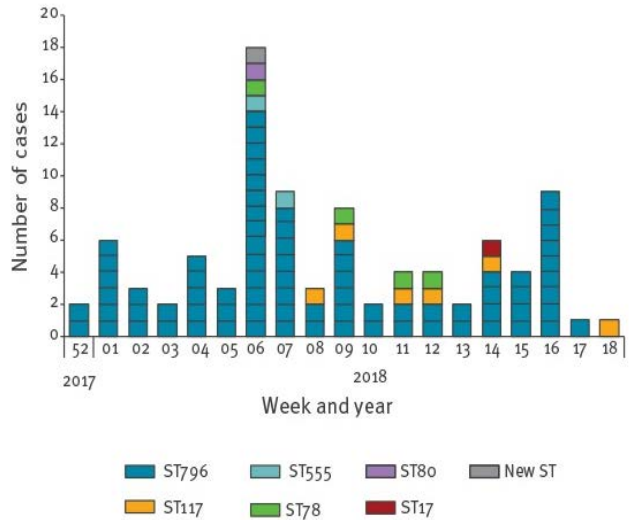
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Outbreak of vancomycin-resistant *Enterococcus faecium* clone ST796, Switzerland, December 2017 to April 2018

Nasstasja Wassilew¹, Helena MB Seth-Smith^{2,3}, Eveline Rolli¹, Yvonne Fietze¹, Carlo Casanova⁴, Urs Führer⁵, Adrian Egli^{2,3}, Jonas Marschall¹, Niccolò Buetti¹

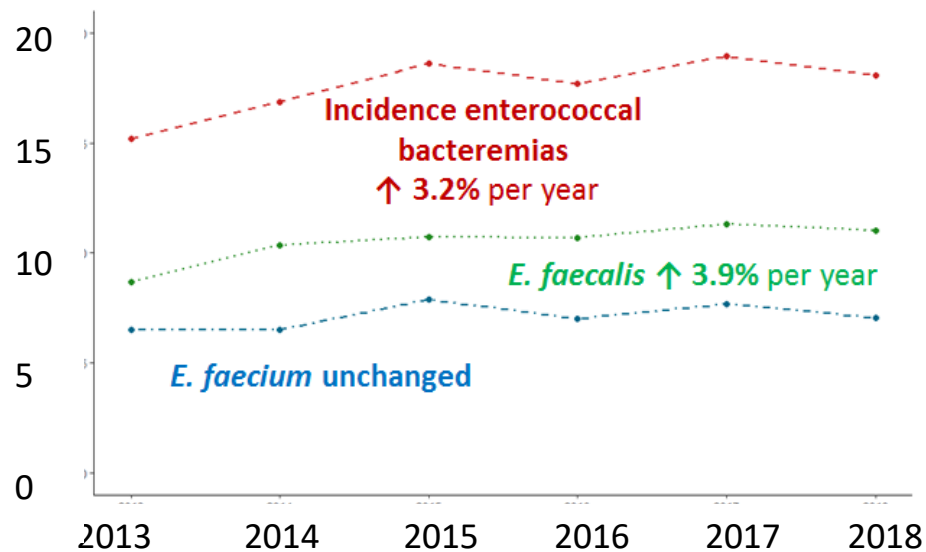


VRE bacteremia 2013 - 2018

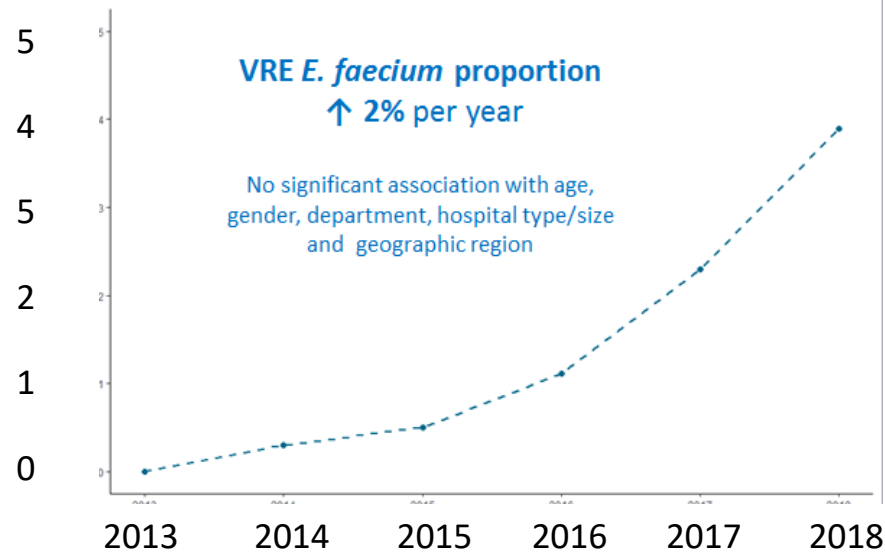
81 Swiss institutions



Time trends bacteremia incidence per 100'000 patientdays



Time trend proportion VRE among *E. faecium* bacteremias



VRE 201



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Departement des Innern EDI
Bundesamt für Gesundheit BAG
Direktionsbereich Öffentliche Gesundheit

2020
(per Internet)



Bitte ausfüllen und innerhalb 24h
an KantonsärztIn/-arzt senden
(nicht direkt ans BAG).*



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Ausbruch Vancomycin-resistenter Enterokokken (VRE)

(≥ 3 VRE-Fälle mit epidemiologischem Zusammenhang auf Stations- oder Institutionsebene)

Epidemiologische Merkmale des Ausbruchs zum Zeitpunkt der Meldung

Anzahl betroffener PatientInnen: _____
Gesamtzahl identifizierter VRE-Fälle (TrägerInnen und klinische Fälle): _____
Anzahl VRE-Fälle mit klinischer Infektion: _____
Gesamtzahl PatientInnen die einem Screening unterzogen wurden: _____

Erster entdeckter Fall: _____ Datum der ersten positiven Probe: _____ Datum der Hospitalisierung: _____

Letzter entdeckter Fall: _____ Datum der ersten positiven Probe: _____

Epidemiologischer Zusammenhang zwischen den Fällen:

- Erkennung beim Screening der KontaktpatientInnen eines VRE-Falles
- Erkennung auf derselben Station bei systematischen Screenings
- Früherer Kontakt zwischen den VRE-Fällen
- Anderer: _____

Vom Ausbruch betroffene Orte: eine Station mehrere Stationen derselben Abteilung mehrere Abteilungen

Molekulare Typisierung: Resistenzgen: vanA vanB
Ergebnisse der Genotypisierung, falls bekannt: _____

Expositionsort des ersten entdeckten Falles

Verlegung aus anderem Spital: in der Schweiz Name der Einrichtung: _____ Kanton: _____

im Ausland Land: _____

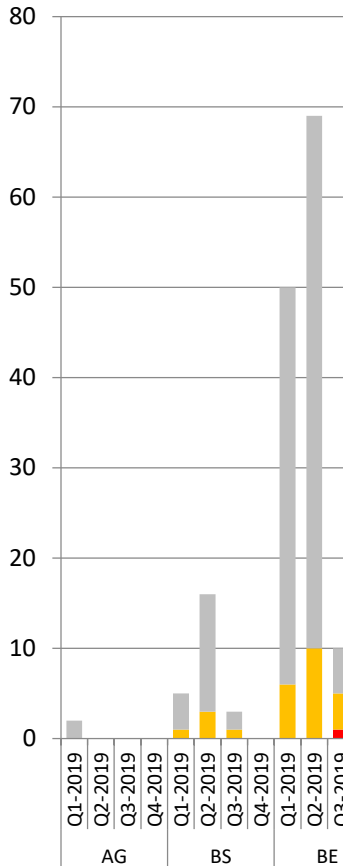
Verlegung aus Pflegeheim: Name der Einrichtung: _____ Kanton: _____

Dialyse-Zentrum: in der Schweiz Name der Einrichtung: _____ Kanton: _____

im Ausland Land: _____

Anderer: _____

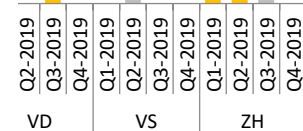
Unbekannt



blood

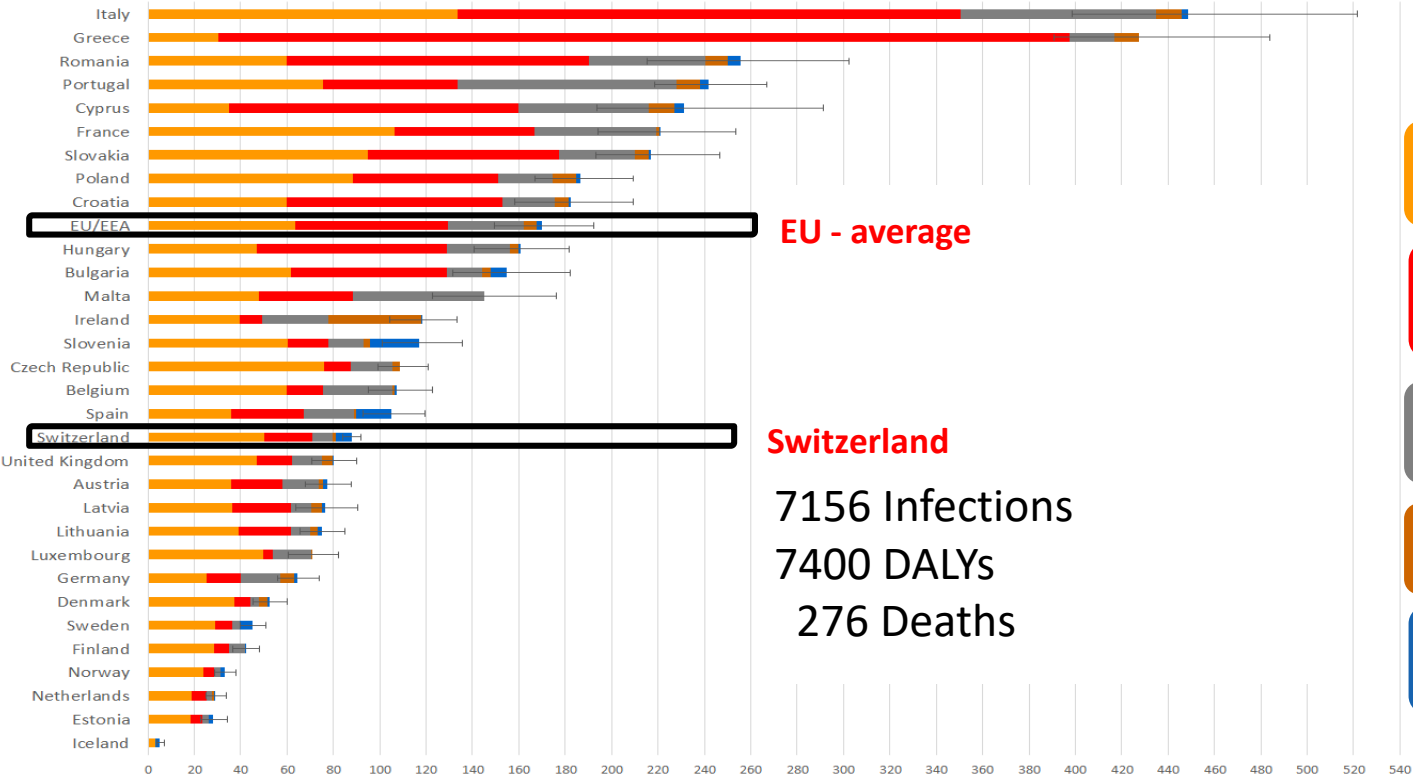
clinical

screening



Burden of Disease EU / CH 2015

Gasser et. al. Lancet Infect Dis 2018



EU - average

Switzerland

7156 Infections
7400 DALYs
276 Deaths

DALY (disability-adjusted life years lost) per 100'000 population

~ESC-R

~Carbapenem-resistant
P. aeruginosa

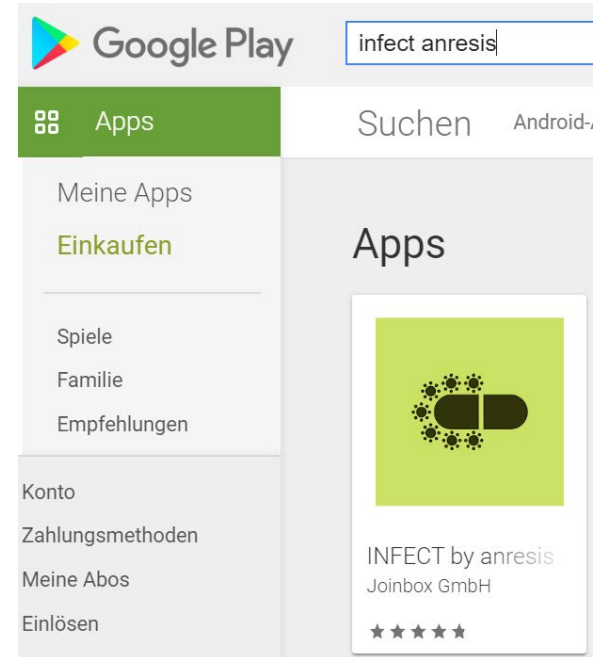
MRSA

VRE

Penicillin- and macrolide-resistant
S. pneumoniae

Outlook

Guidelines in infect.info





ANRESIS stellt die aufbereiteten Daten sowohl der Öffentlichkeit, als auch den Behörden, den Spielern, der Ärzteschaft und interessierten Forschungsgruppen zur Verfügung.

Schweizerisches Zentrum für Antibiotikaresistenzen

Was bedeutet Antibiotikaresistenz?

NEWS

Lernen (quam) dicitur sit sanet, constanter salpingis ellit.

Lernen (quam) dicitur sit sanet, constanter salpingis ellit.

ANRESIS sammelt kontinuierlich alle in der Risikodiagnostik gemeldeten, anonymisierten Resistenzdaten von

>30	9	>70	>1000
Personen	Werkstätten	Spieler	Aggregaten

ANRESIS wird angetrieben durch folgende Organisation

SWISSPROS

UNIVERSITÄT ZÜRICH

UNIVERSITÄT BASEL

UNIVERSITÄT BASELSTADT

UNIVERSITÄT BASEL LUDWIG

UNIVERSITÄT BASELSTADT

UNIVERSITÄT BASELSTADT

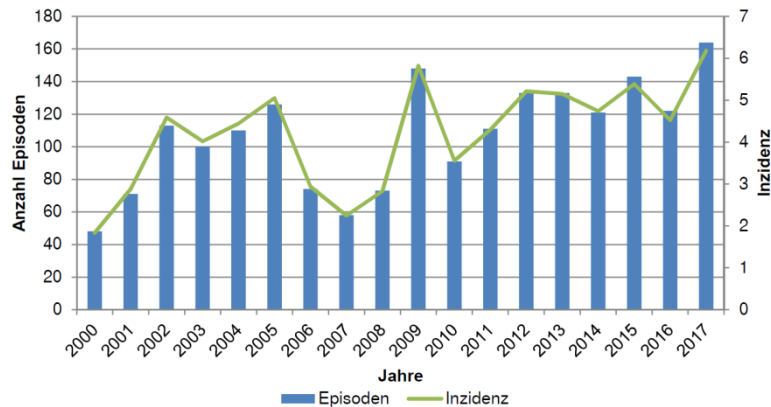
- Modern design
- Adapted for handhelds
- Less text, more interactive
- Interactive DB query remains
- Information for lay persons

Outlook

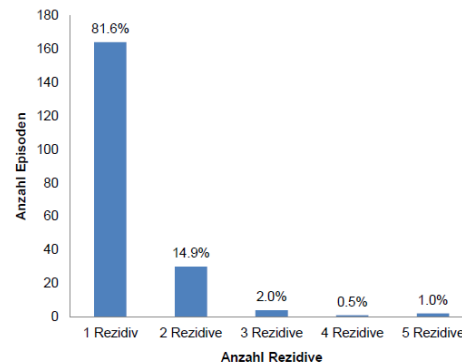
C. difficile surveillance



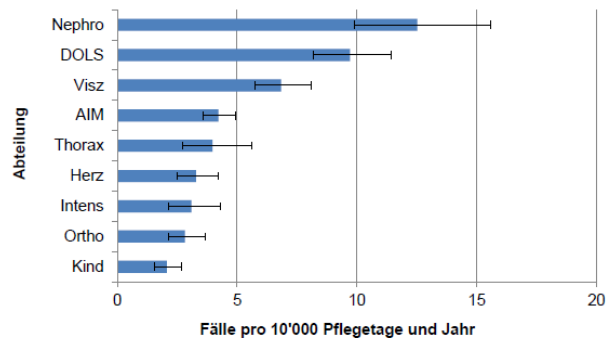
Episodes (n) and incidence 2000 - 2017



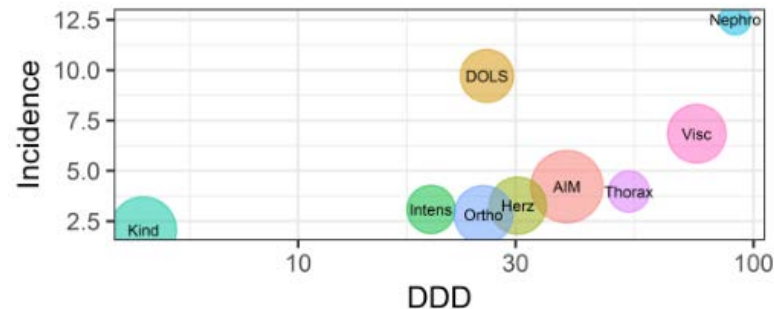
Relapses (total 10%)



Incidence by department



Correlation antibiotic use and incidence



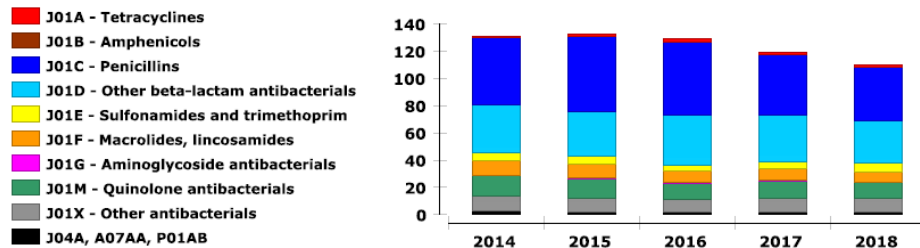
Outlook

ACD reporting



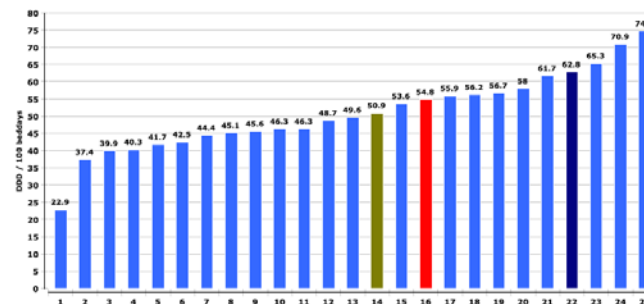
Yearly report

Total use by ATC-group in DDD/100beddays



Benchmark report

Global use

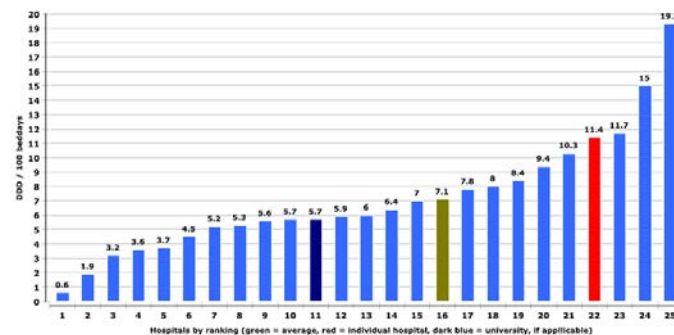


Top ten list in DDD/100beddays (% of all)

Top ten overall

Rank	Antibiotic	2018	2017	% change last two years
1	Amoxicillin-clavulanic acid	26.8 (24.4%)	29.8 (25.0%)	-10.1
2	Cefuroxime	12.1 (11.0%)	13.5 (11.3%)	-10.5
3	Ceftriaxone	10.6 (9.6%)	11.5 (9.7%)	-8
4	Ciprofloxacin	8.6 (7.8%)	10.8 (9.1%)	-20.2
5	Metronidazole	6.0 (5.5%)	5.5 (4.6%)	7.6
6	Trimethoprim-sulfamethoxazole	5.6 (5.1%)	4.4 (3.7%)	26.5
7	Clarithromycin	4.3 (3.9%)	5.0 (4.2%)	-12.7
8	Piperacillin-tazobactam	4.1 (3.7%)	4.2 (3.5%)	-2.4
9	Flucloxacillin	3.8 (3.5%)	5.2 (4.4%)	-27.3
10	Cefazolin	3.3 (3.0%)	2.8 (2.4%)	19.3

Broadpectrum antibiotics (%)

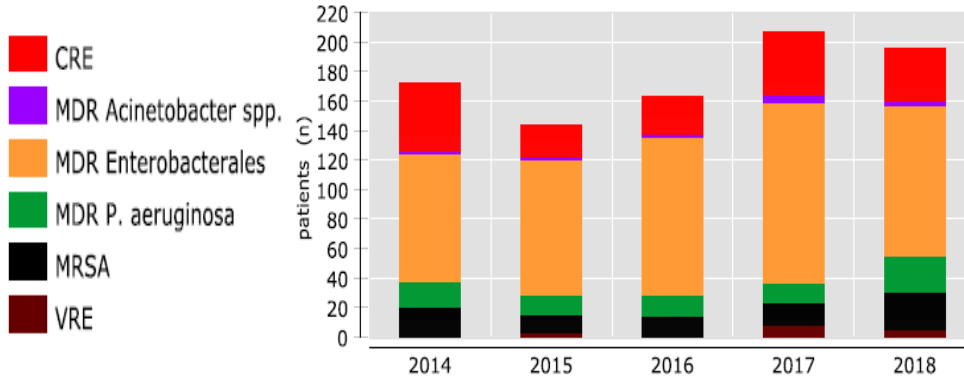


Outlook

MDR reporting



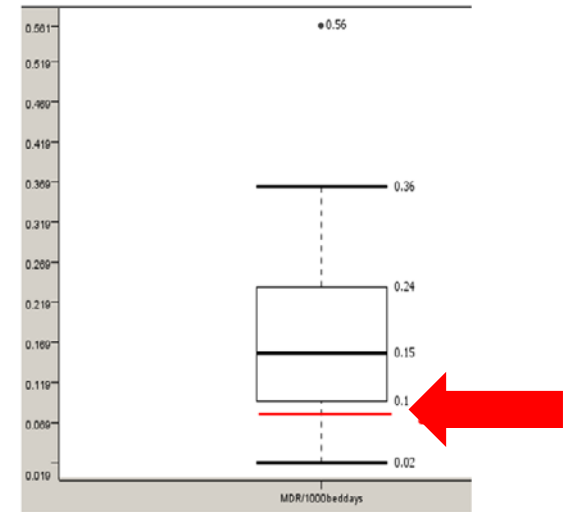
MDR bacteremia in 5 university hospitals 2014 - 2018



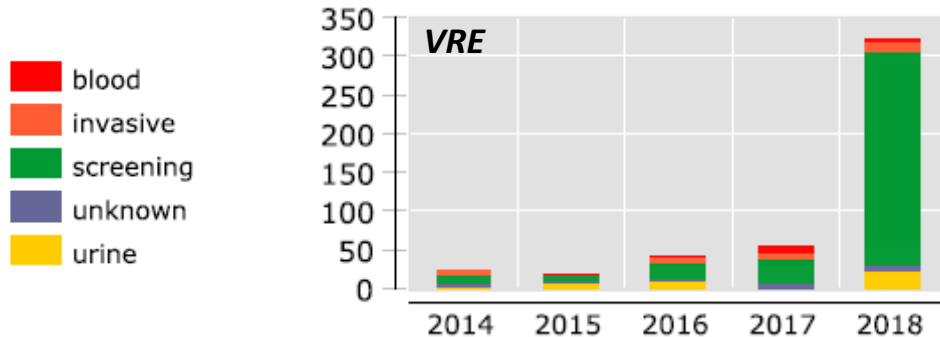
Benchmarking

MDR bacteremias / 10'000 beddays

ESCR Enterobacterales



MDR at all sites dependent from screening activities



Further reading



Kontinuierliche Monitorisierung von Resistenzsituation und Antibiotikaverbrauch

Aktuelle Entwicklung der Antibiotikaresistenzen in der Schweiz

Dr. Michael Gasser^a, PhD; Prof. Dr. med. Jacques Schrenzel^{b,c}; PD Dr. med. Andreas Kronenberg^a für das Schweizerische Zentrum für Antibiotikaresistenzen*

^a Institut für Infektionskrankheiten, Universität Bern, Bern; ^b Laboratoire de bactériologie, Hôpitaux Universitaires Genève, Genève; ^c Laboratoire de recherche génomique, Université de Genève, Genève

* Die Mitglieder des Steuerungsausschusses von anresis.ch sowie die mit anresis.ch verbundenen Laboratorien sind am Schluss des Artikels aufgeführt.

SMF, 2018;18(46):943-949

www.anresis.ch



Antibiotic resistance data

The number of laboratories sending data to anresis.ch varies over time. Therefore data may not be comparable between years.

Definition of selection [New query](#) [Footnotes](#) [Modify query](#)

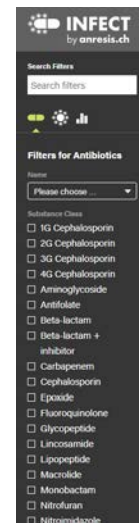
Results:

Selected Criteria:

Microorganism: **Citrobacter koseri**; Antibiotic: **all**; Time interval: **2018**; Region: **all**; Age: **all**; In-/outpatient: **all**; Anatomic localization: **all**; Split by: **in-/outpatient**

Drug, in-/outpatient	2018			n
	Susceptible %	Intermediate %	Resistant %	
Aminoglycoside				
hospitalized	99.4	0.0	0.6	2228
outpatient	99.9	0.1	0.0	1085
all	99.6	0.0	0.4	3313
Aminopenicillin				
hospitalized	0.0	0.0	99.9	2274
outpatient	0.1	0.0	99.9	1392

www.infect.info



Thanks for your attention and to ...

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ANRESIS laboratories (www.anresis.ch)

ANRESIS hospital pharmacies (www.anresis.ch)



Financial support

Swiss Federal Office of Public Health (SFOPH)
Institute for Infectious Diseases, University Bern

ANRESIS - Team

Andreas Kronenberg / Michael Gasser
Catherine Plüss / Olivier Friedli
Chantal Studer, data manager
Stephan Gartenmann, IT support
Daniel Wartmann, IT support

Joinbox GmbH

Felix Steiner, Lina van der Weg, Pascal Frey,
u.a.

ANRESIS advisory board

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StAR), O. Dubuis, A. Egli, V. Gaia, D. Koch
(BAG), S. Leib, J. Marschall, P. Nordmann, V.
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Schrenzel, A. Widmer, G. Zanetti, R. Zbinden