

CONGRESSO NAZIONALE

AGGIORNAMENTI INFETTIVOLOGICI: HIV, EPATITI &...

Firenze, 27-29 Gennaio 2025

La sorveglianza su antibiotici e germi MDR in Toscana

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Dpt. Experimental and Clinical Medicine

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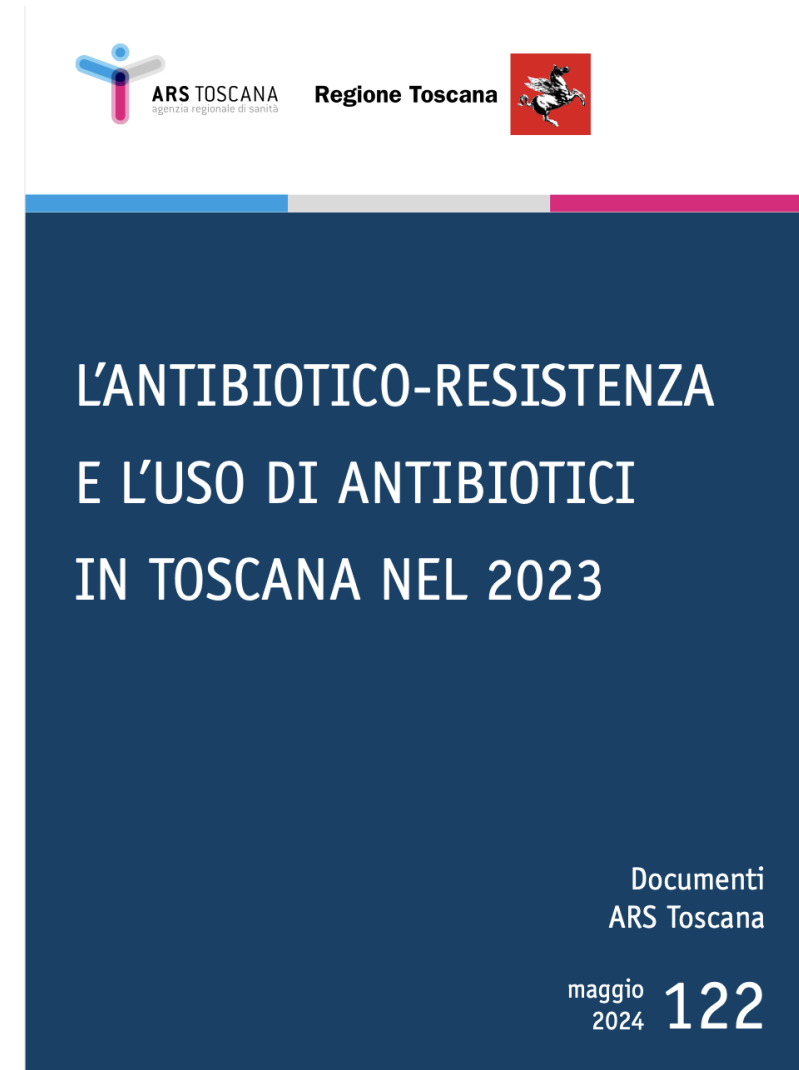
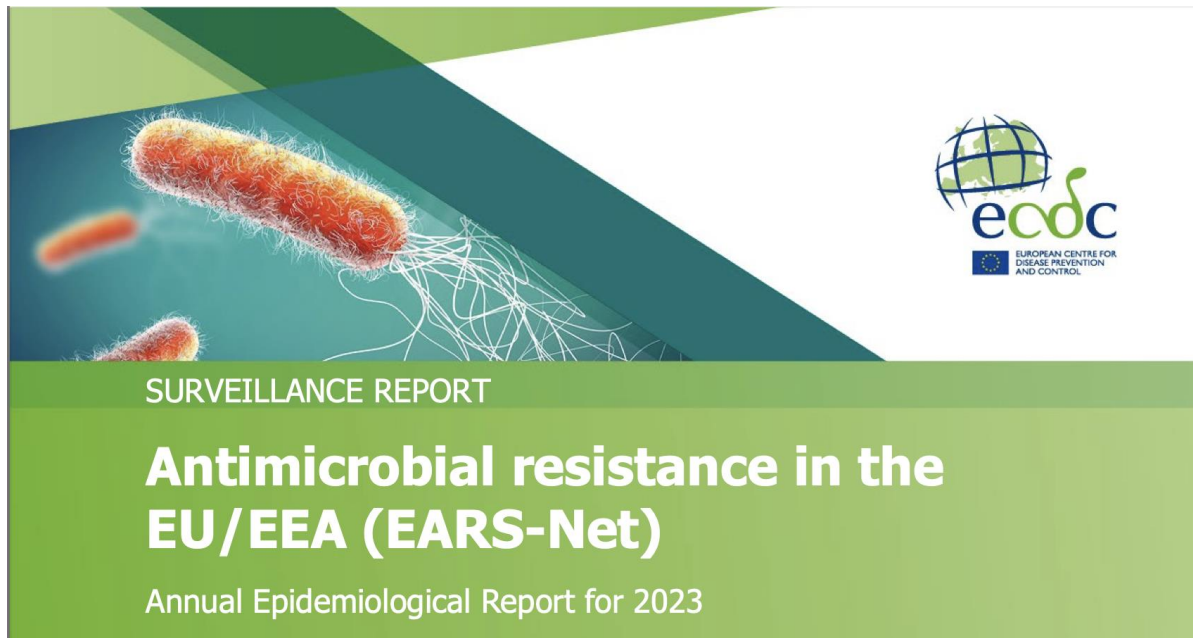
Florence Careggi University Hospital



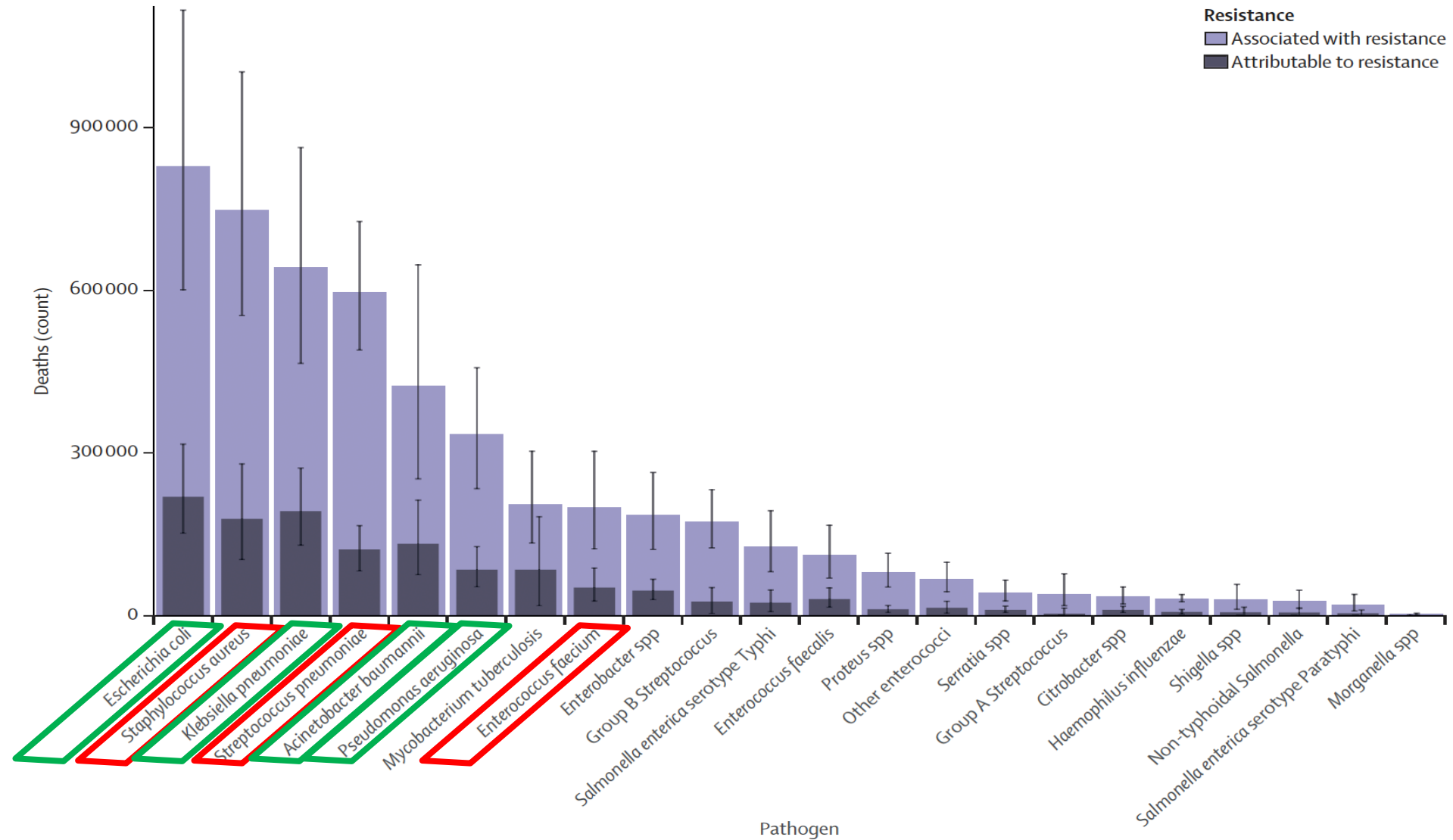
Disclosures

Consultancies / Speaker's bureau / Research grants / Travel grants from: Accelerate, Alifax, Angelini, Becton-Dickinson, bioMérieux, MSD, Pfizer, Shionogi, ThermoFisher, VenatorX

Batteri antibiotico-resistenti: Fonti dati epidemiologici



Global burden of antimicrobial resistance by pathogen, 2019

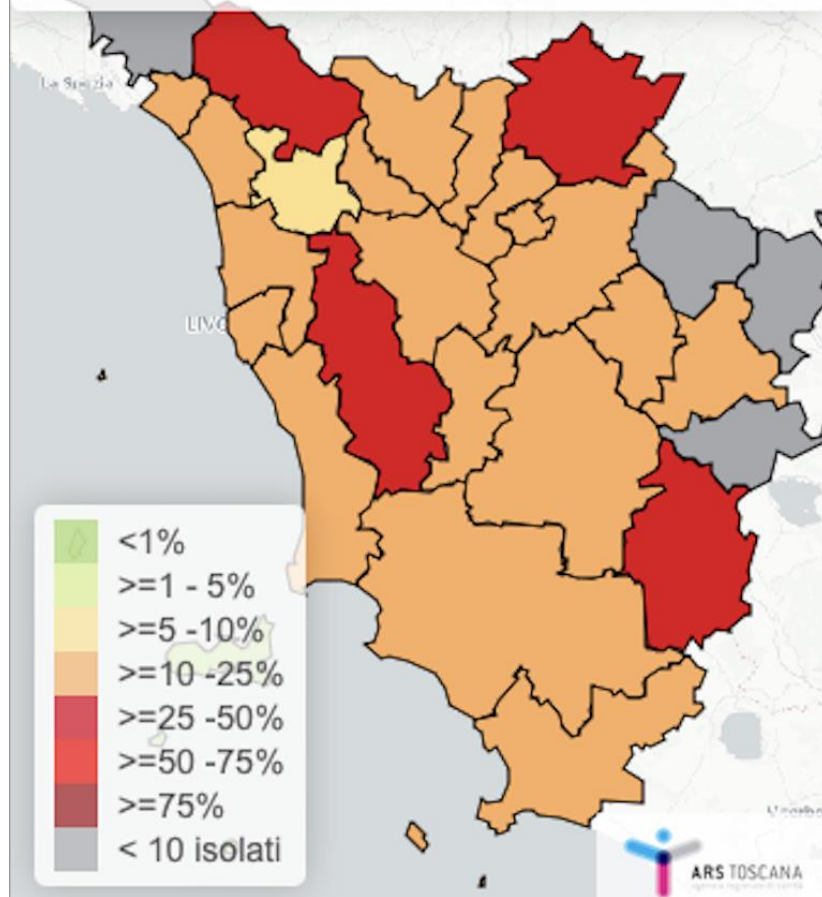


MRSA, % resistenza in Toscana, Italia e Europa (isolati invasivi)

Staphylococcus aureus meticillino resistente (MRSA) - Mappa per zona distretto

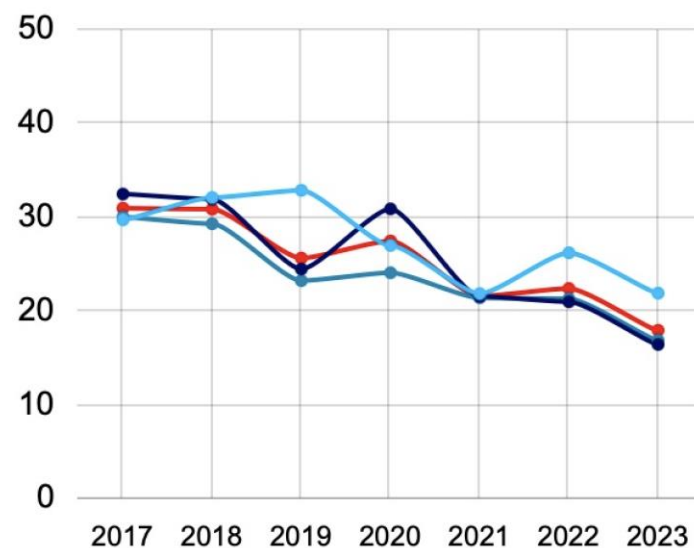
Rapporto (x 100) - Anno 2023 - Totale - Emocolture

Fonte: ARS - Rete SMART

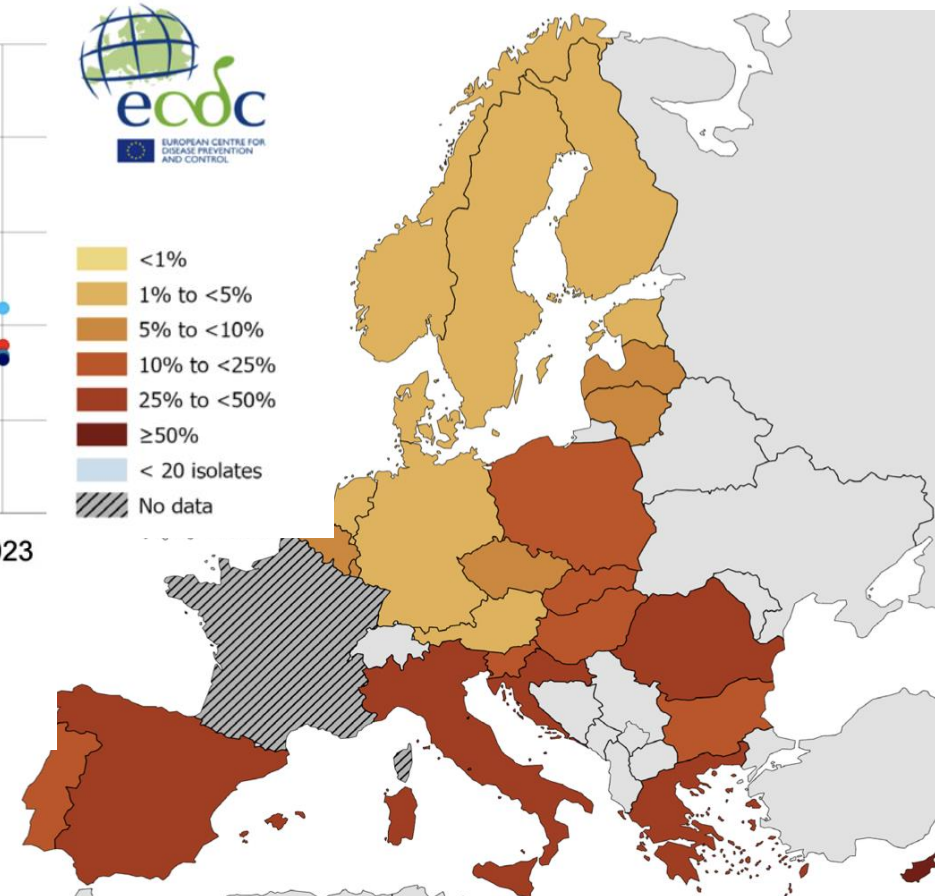


Rapporto (x 100) - Totale - Emocolture

Fonte: ARS - Rete SMART



18%



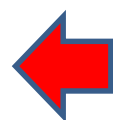
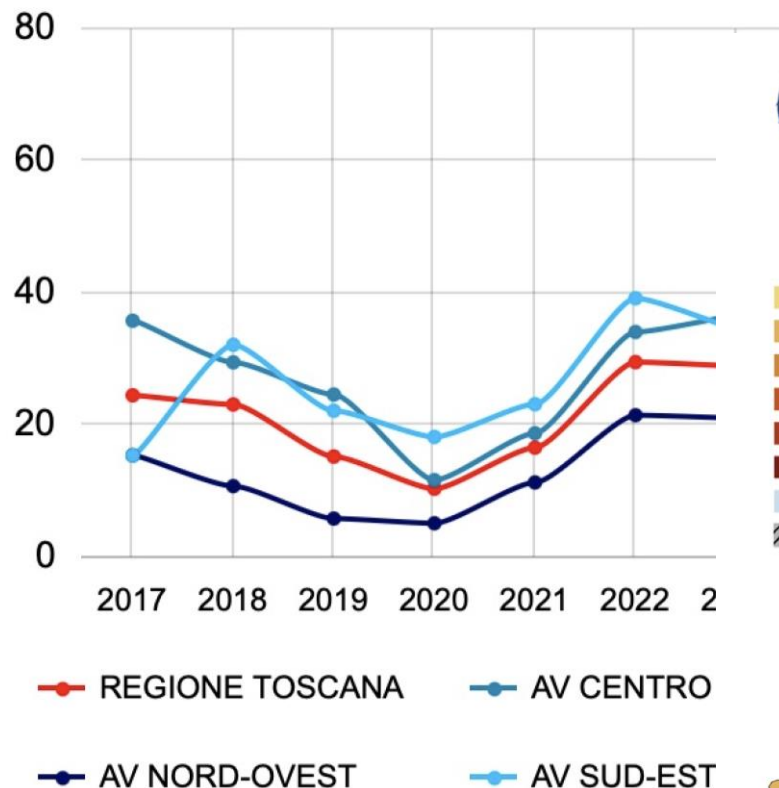
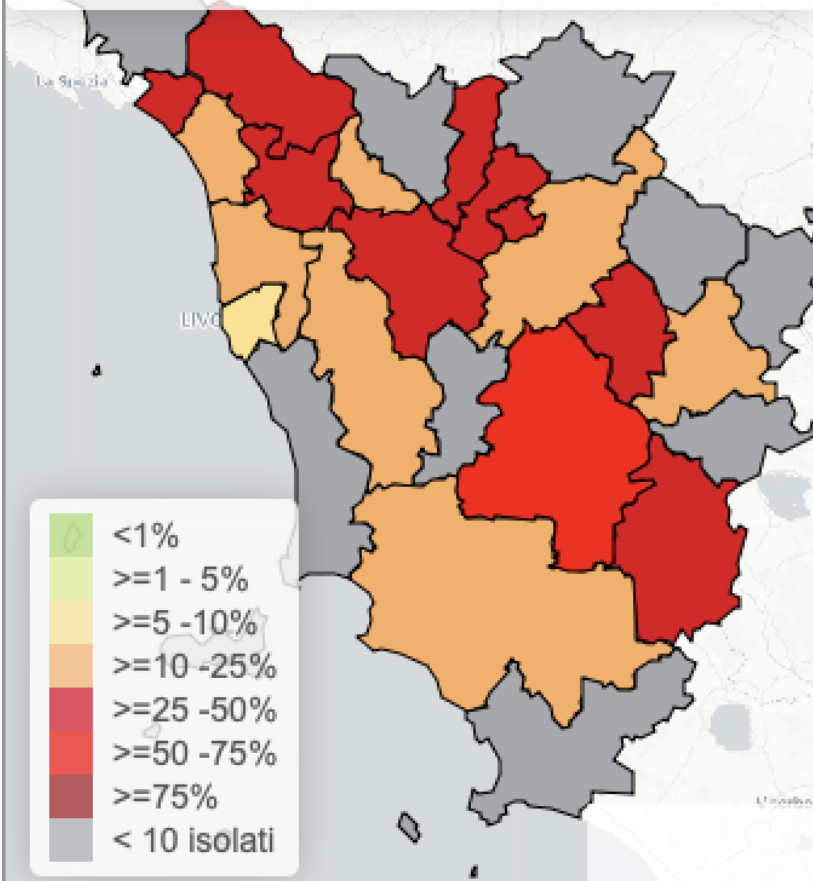
26.6%

VRE, % resistenza in Toscana, Italia e Europa (isolati invasivi)

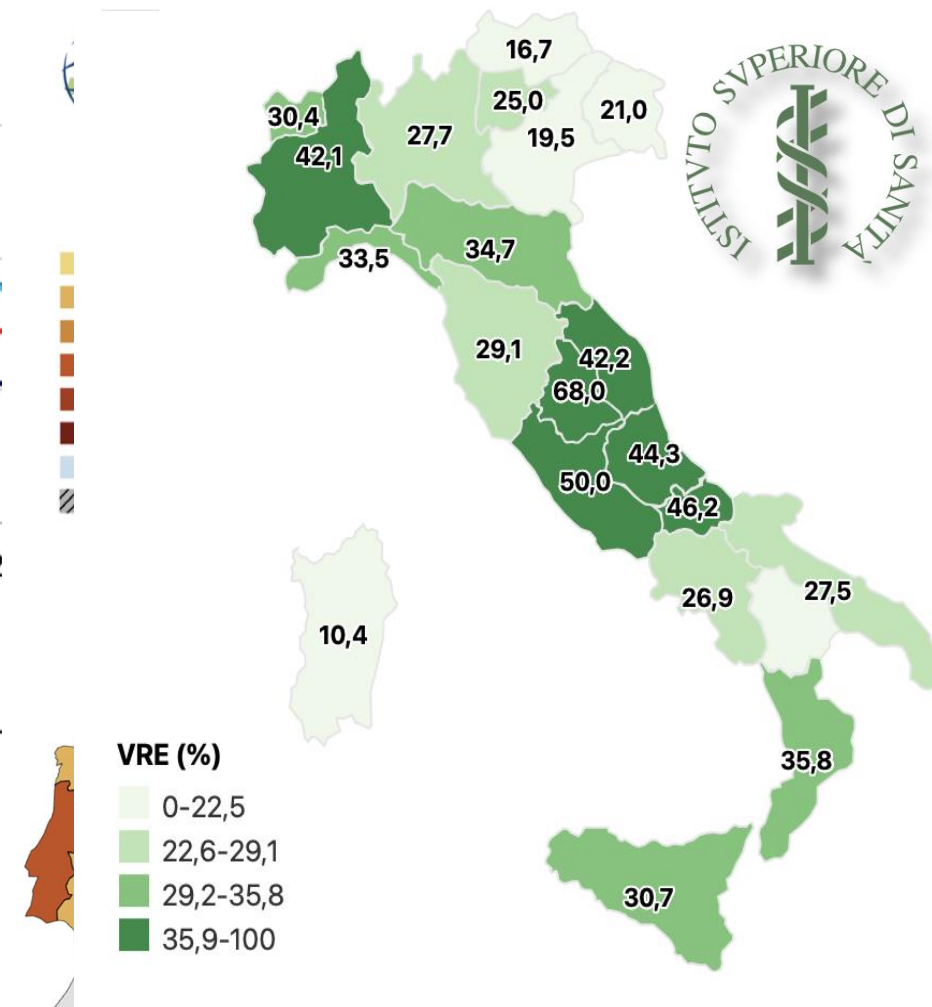
Enterococcus faecium resistente alla vancomicina - Mappa per zona distretto

Rapporto (x 100) - Anno 2023 - Totale - Emocolture

Fonte: ARS - Rete SMART



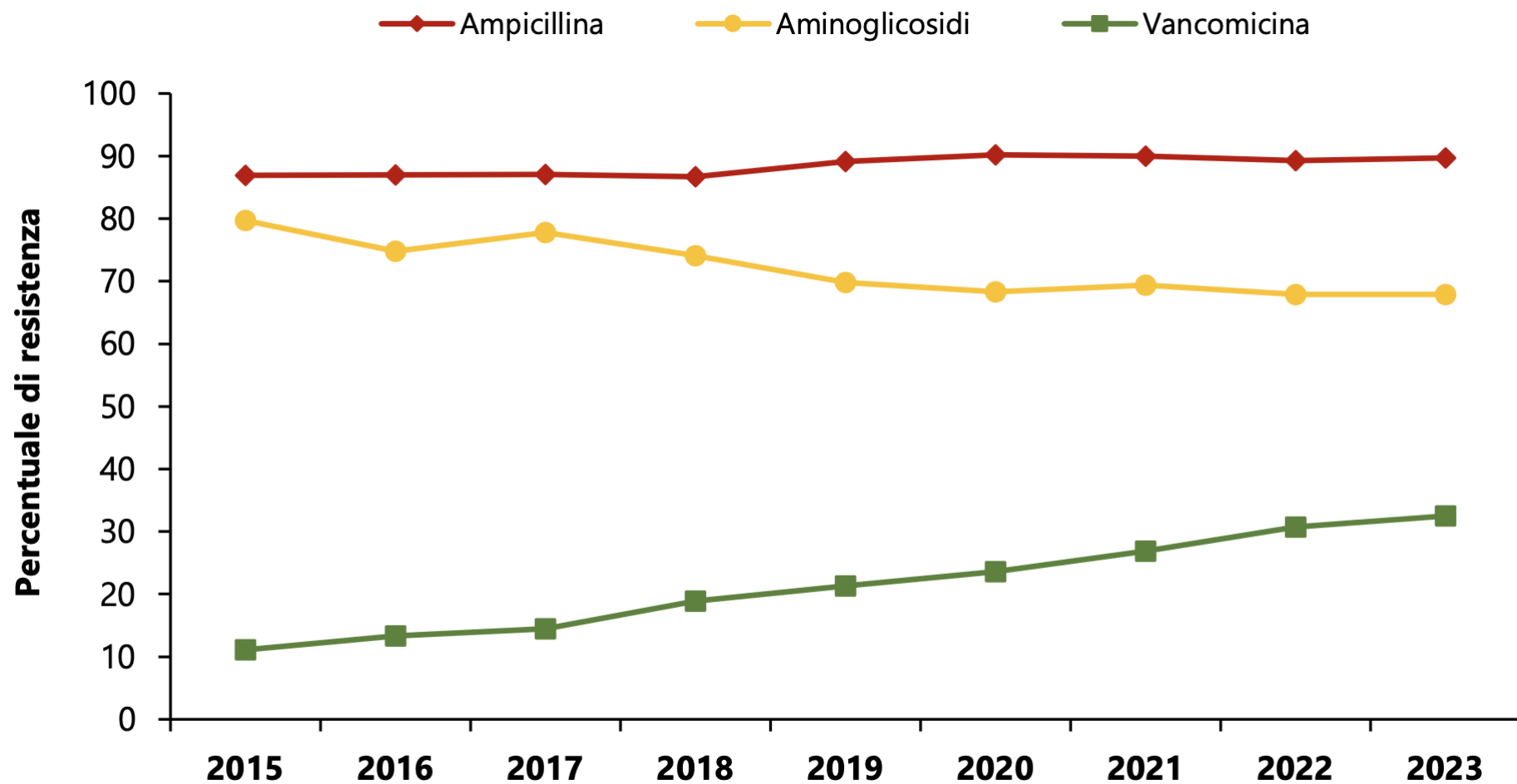
29.2%



32.5%



E. faecium: la resistenza in Italia (tendenza)

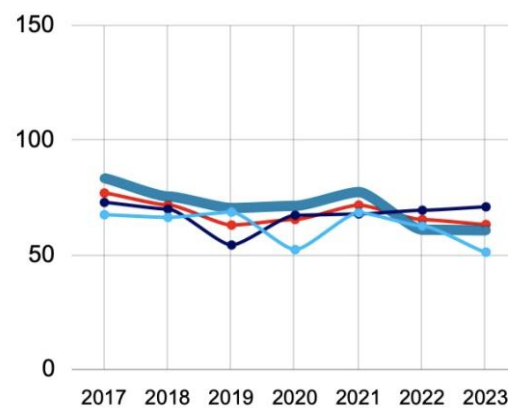
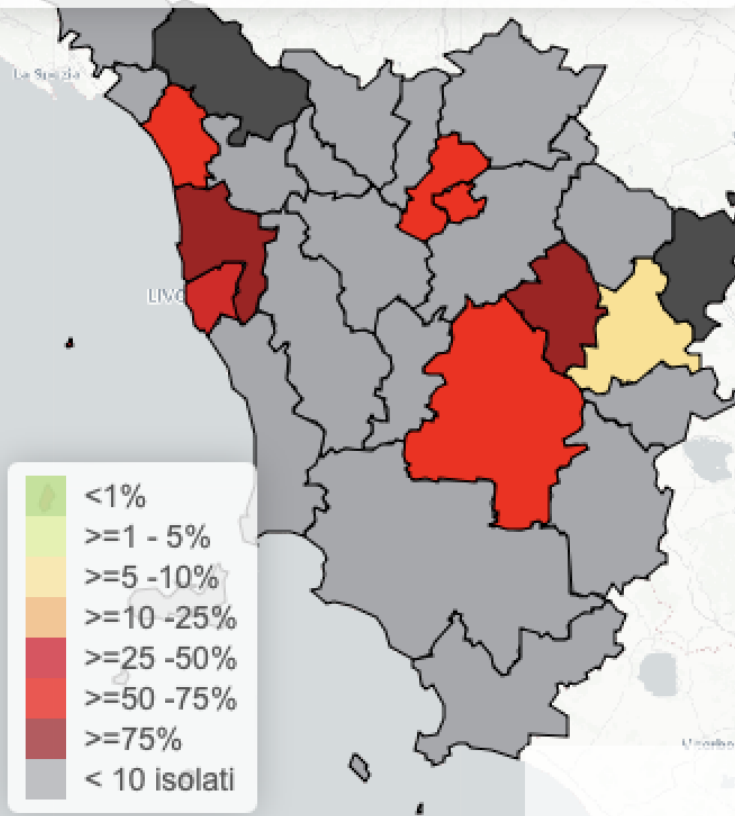


Acinetobacter: resistenza ai carbapenemi (2023)

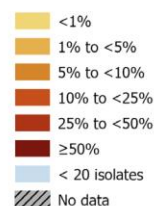
Acinetobacter spp. resistente ai carbapenemi - Mappa per zona distretto

Rapporto (x 100) - Anno 2023 - Totale - Emocolture

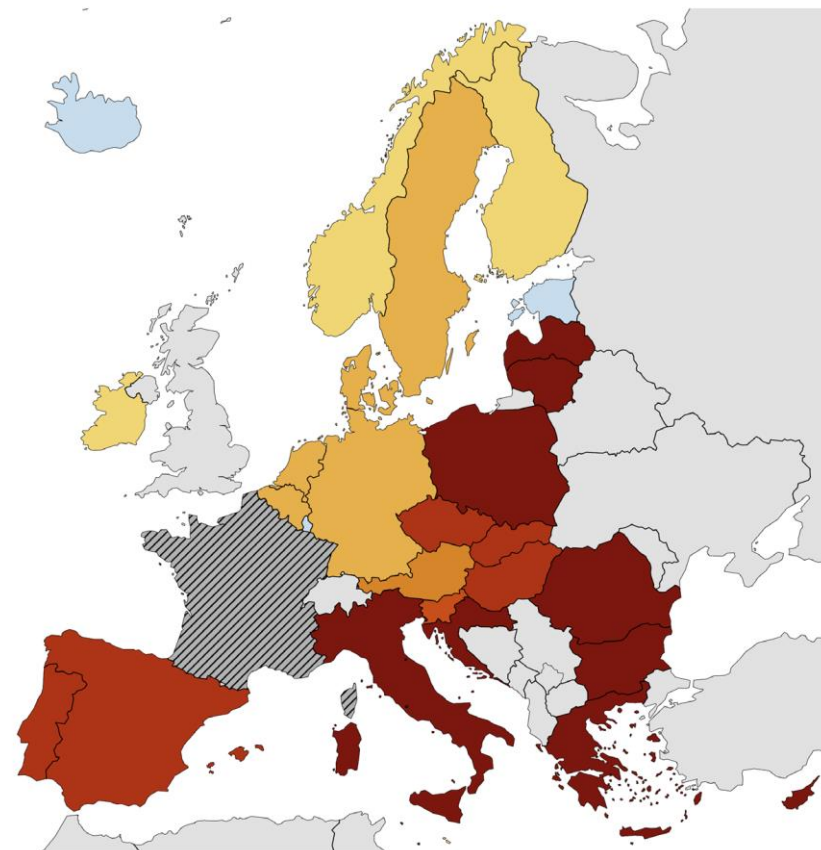
Fonte: ARS - Rete SMART



63.6%

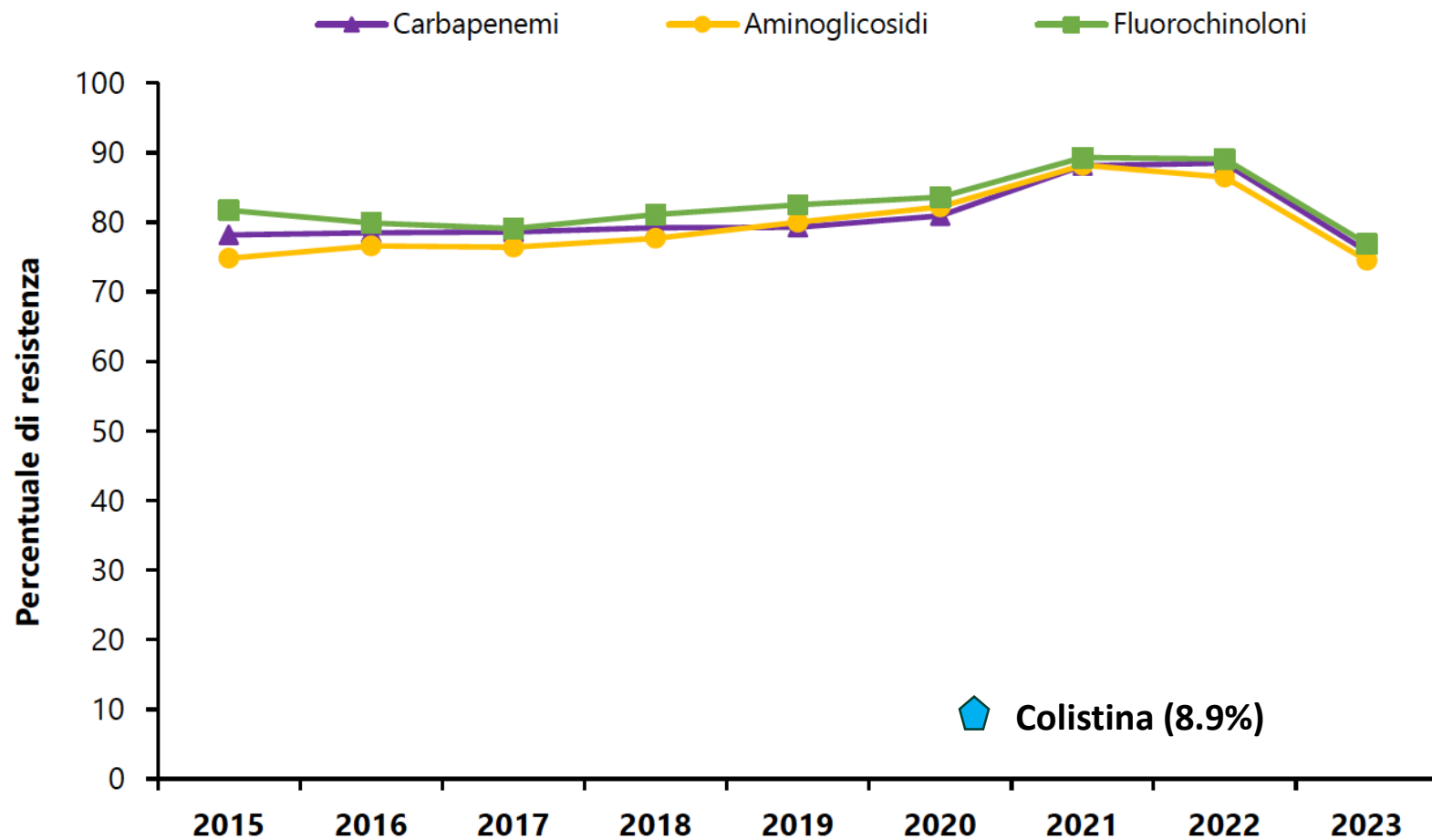


Countries not visible in the main map extent



75.8%

Acinetobacter: la resistenza in Italia (tendenza)



Global antimicrobial resistance and use surveillance system (GLASS) report 2022 – World Health Org

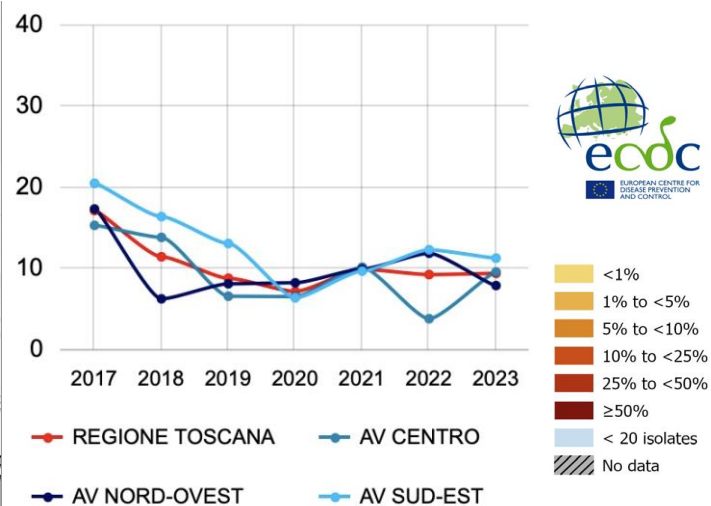
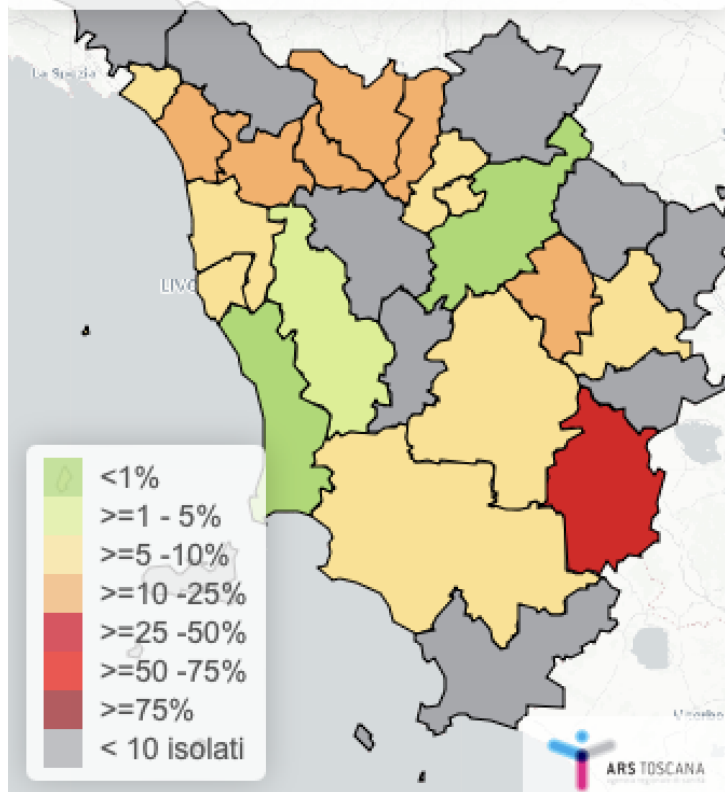
AR-ISS: sorveglianza nazionale dell'Antibiotico-Resistenza, 2023

Pseudomonas aeruginosa MDR (2023)

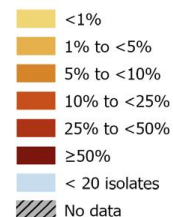
Pseudomonas aeruginosa multiresistente (MDR) - Mappa per zona distretto

Rapporto (x 100) - Anno 2023 - Totale - Emocolture

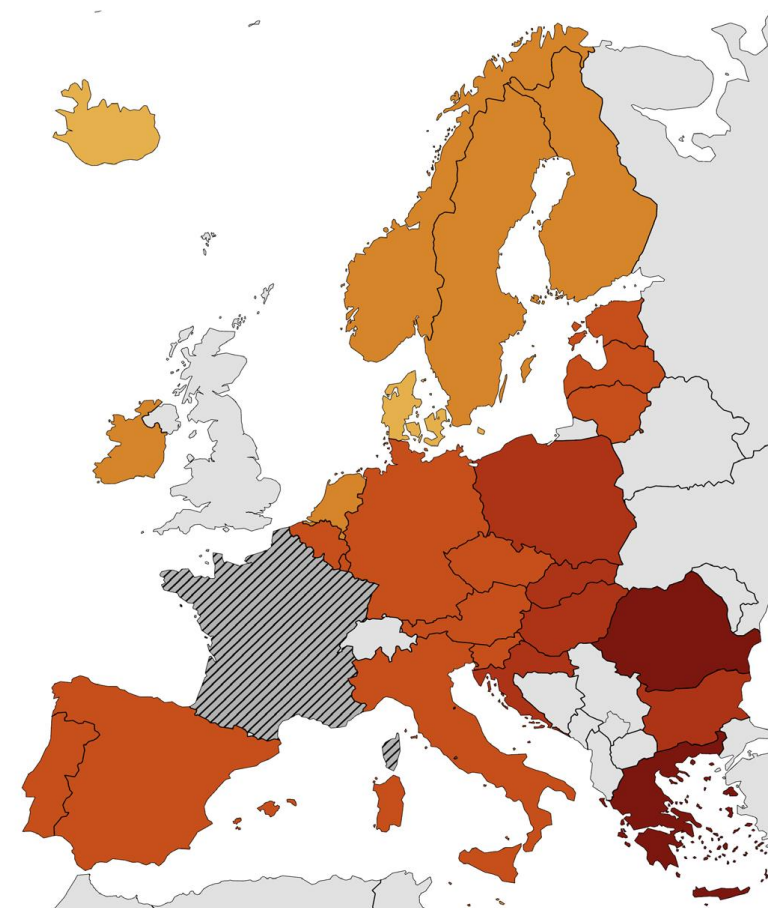
Fonte: ARS - Rete SMART



8.4%

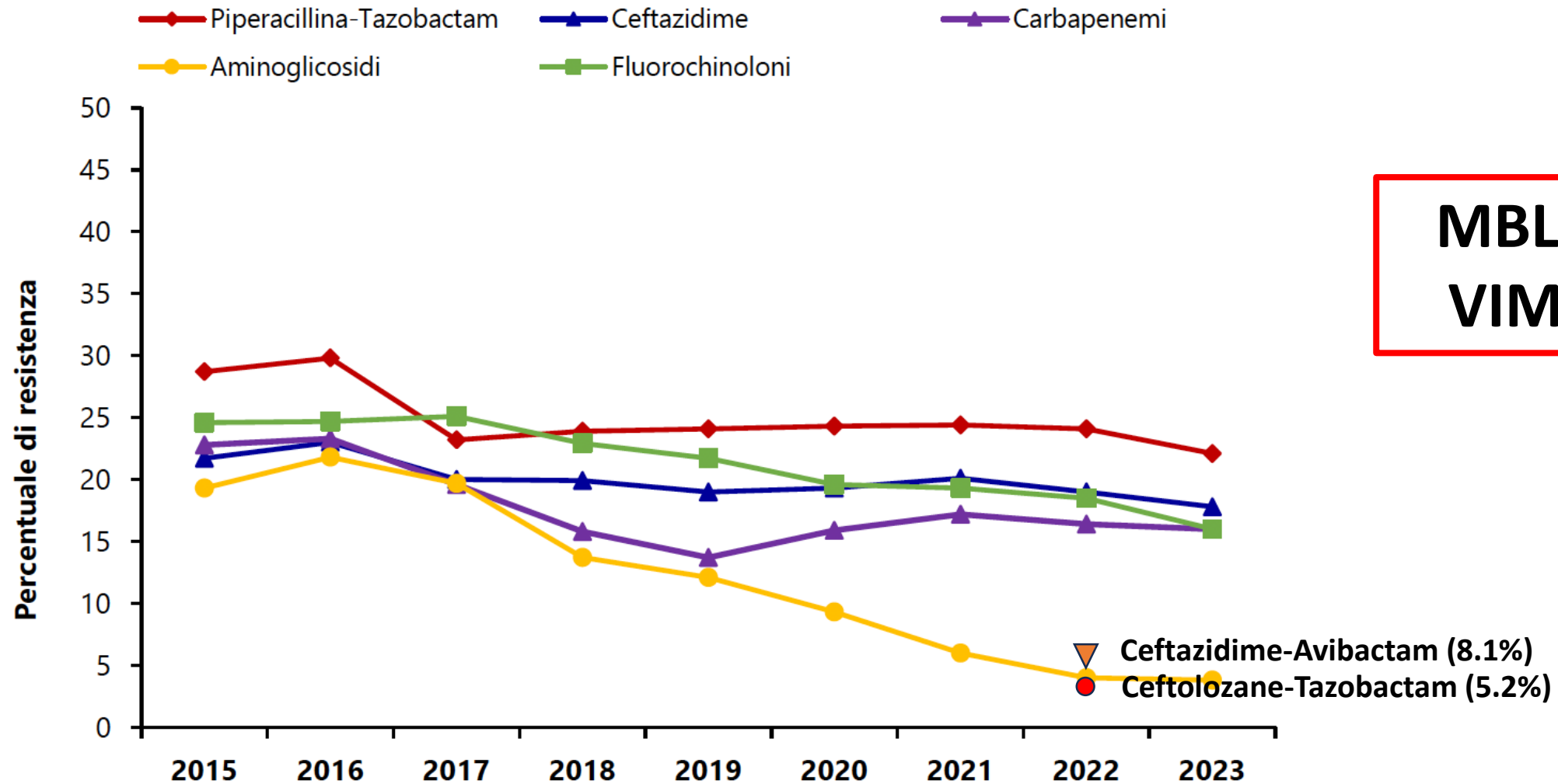


Countries not visible in the main map extent

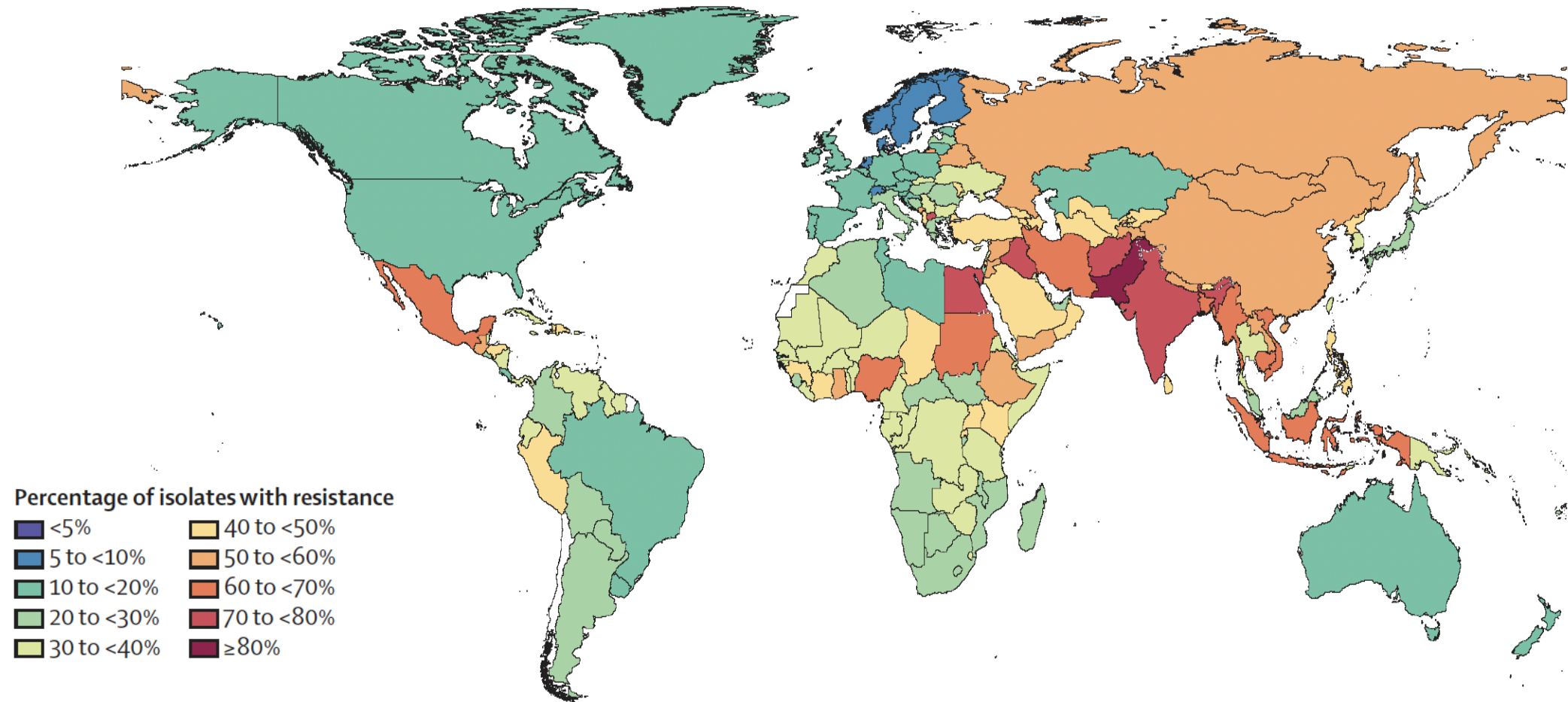


16%

Pseudomonas aeruginosa: la resistenza in Italia (tendenza)



Escherichia coli: RESISTENZA a cefalosporine di 3rd



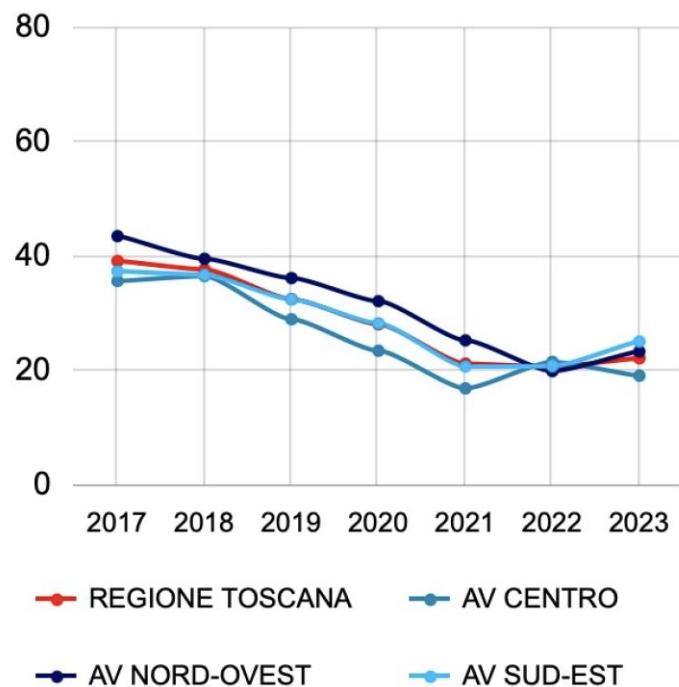
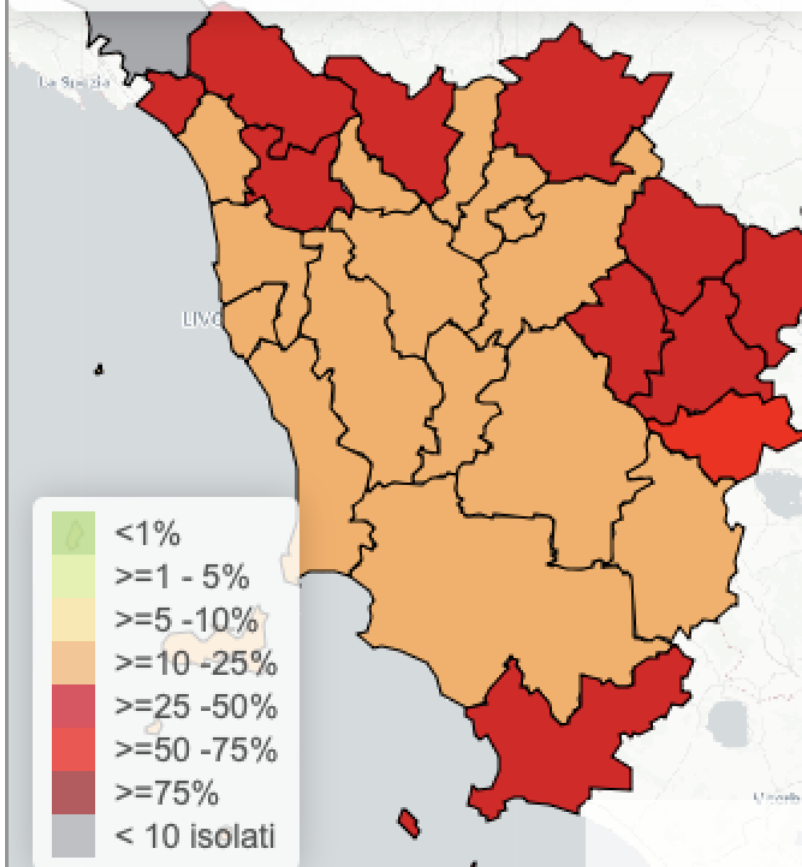
Principale meccanismo di resistenza : ESBL e AmpC-type beta-lattamasi

CREC, % resistenza in Toscana e Europa (isolati invasivi)

**Escherichia coli resistente alle cefalosporine -
Mappa per zona distretto**

Rapporto (x 100) - Anno 2023 - Totale -
Emocolture

Fonte: ARS - Rete SMART



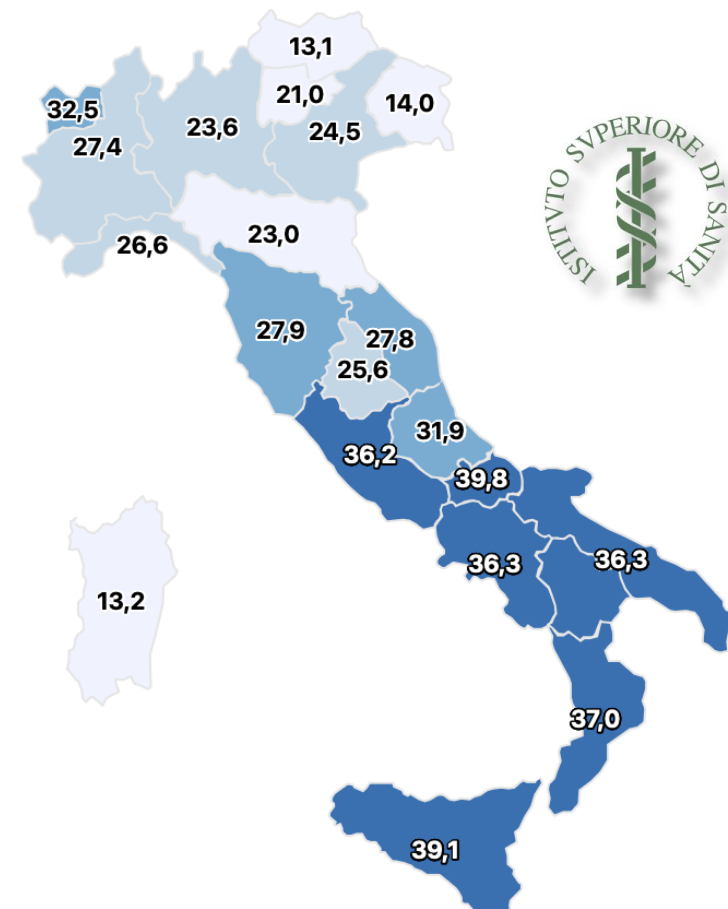
21.5%

CREC (%)

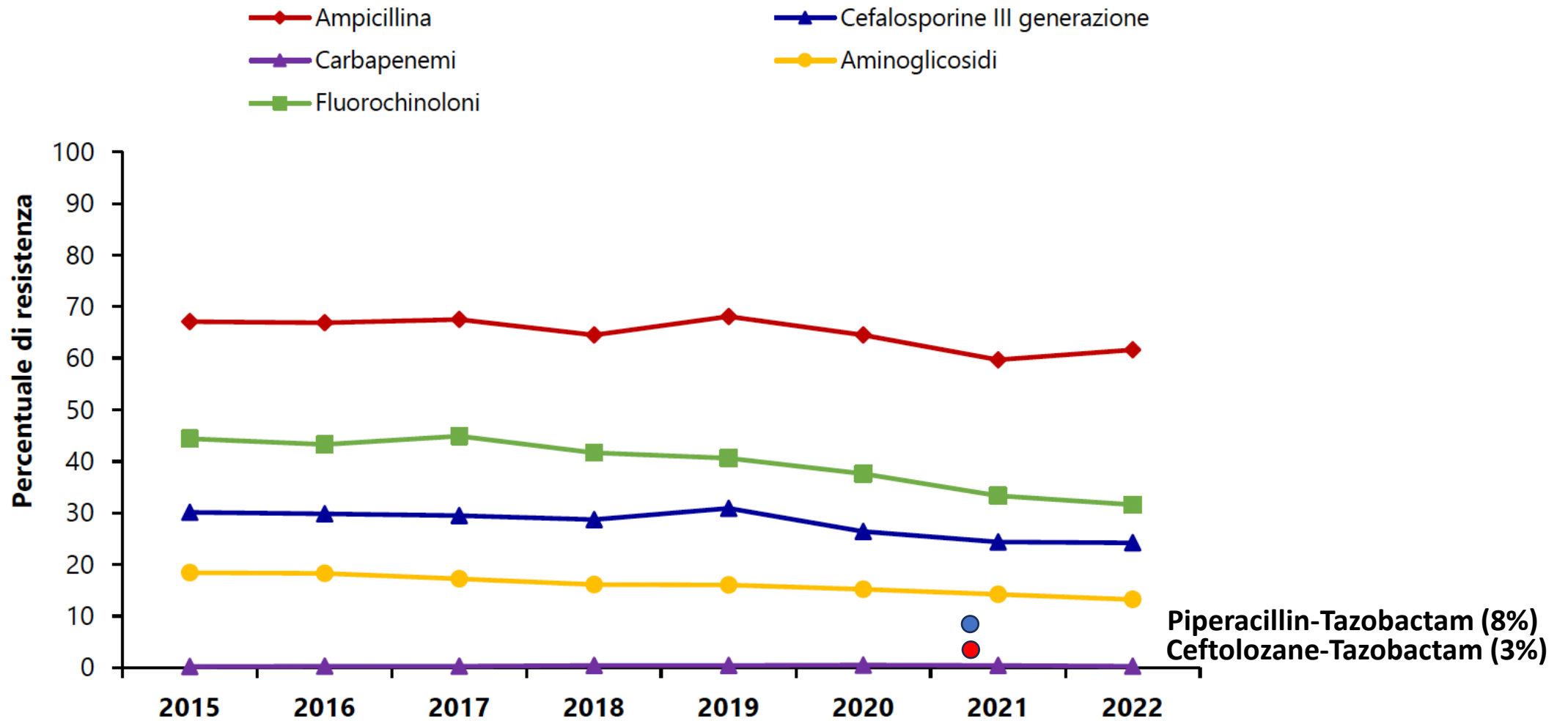
- 0-23,0
- 23,1-27,4
- 27,5-36,1
- 36,2-100



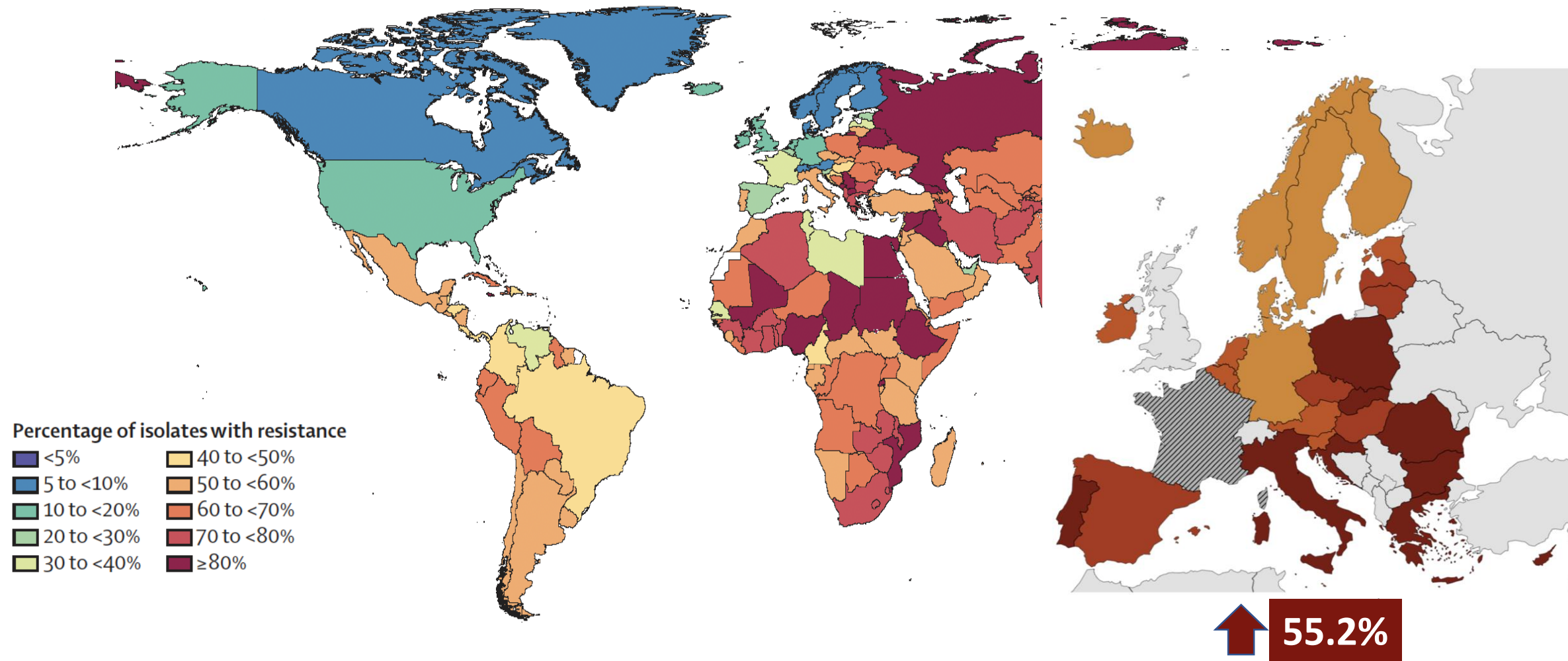
26.7%



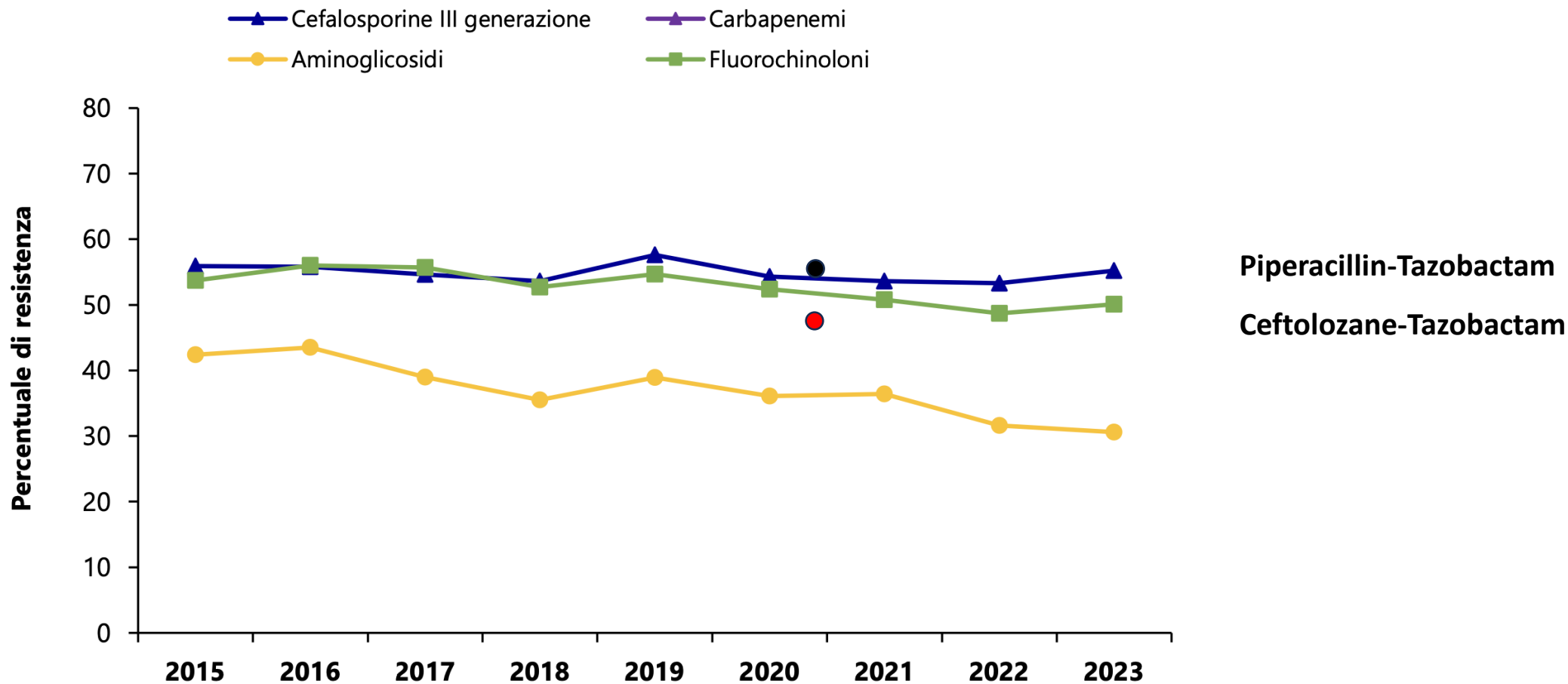
Escherichia coli: la resistenza in Italia (tendenza)



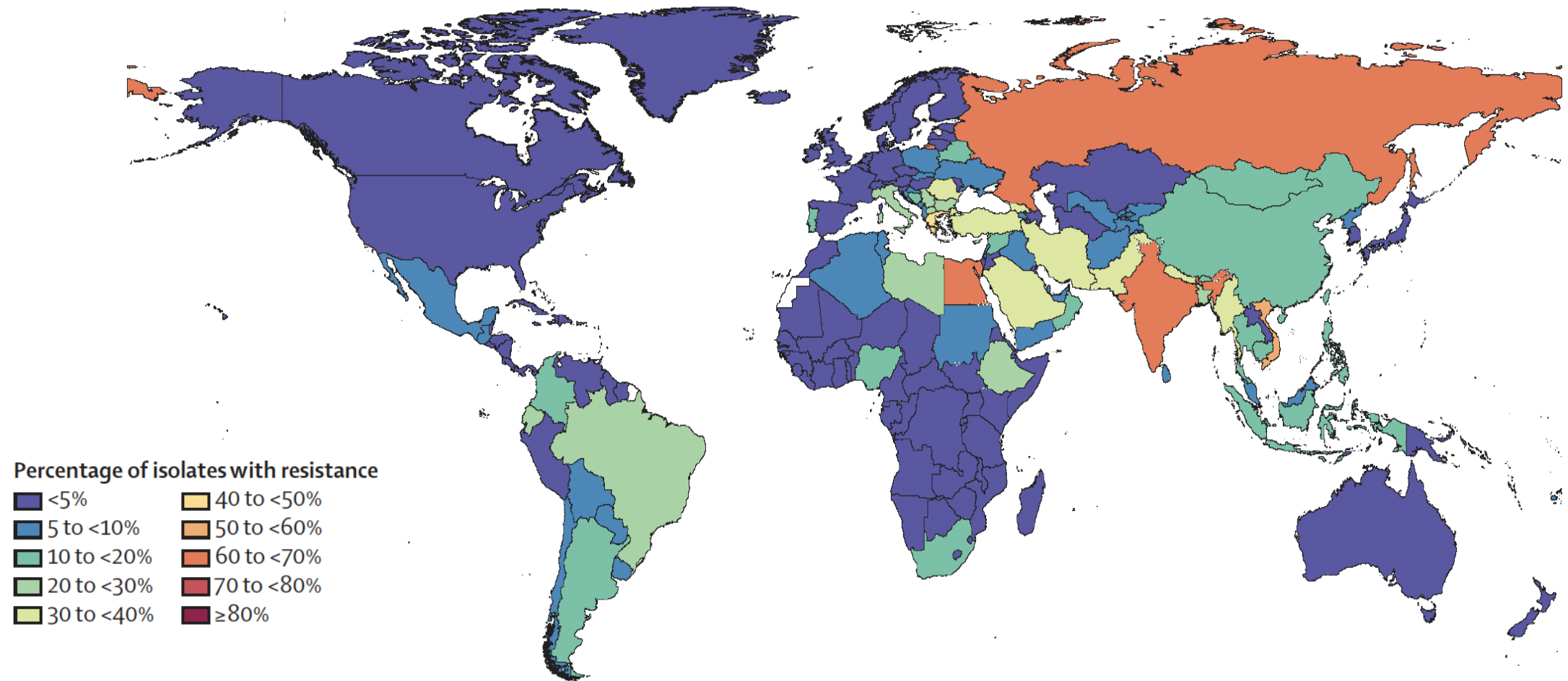
Klebsiella pneumoniae: RESISTENZA a cefalosporine di 3rd (2022)



Klebsiella pneumoniae: la resistenza in Italia (tendenza)



Klebsiella pneumoniae: RESISTENZA a carbapenemi



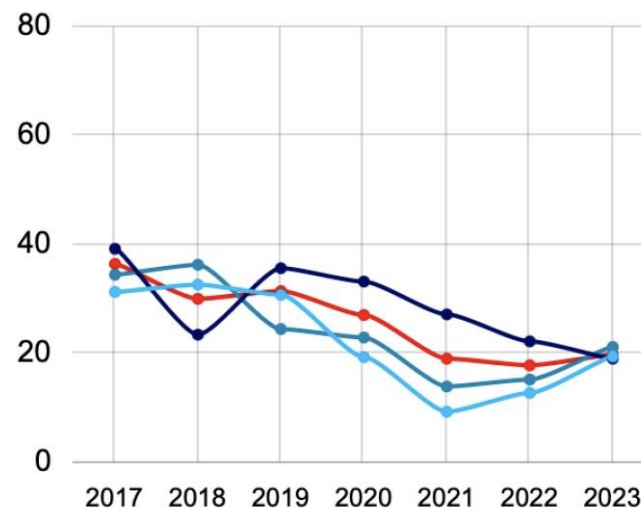
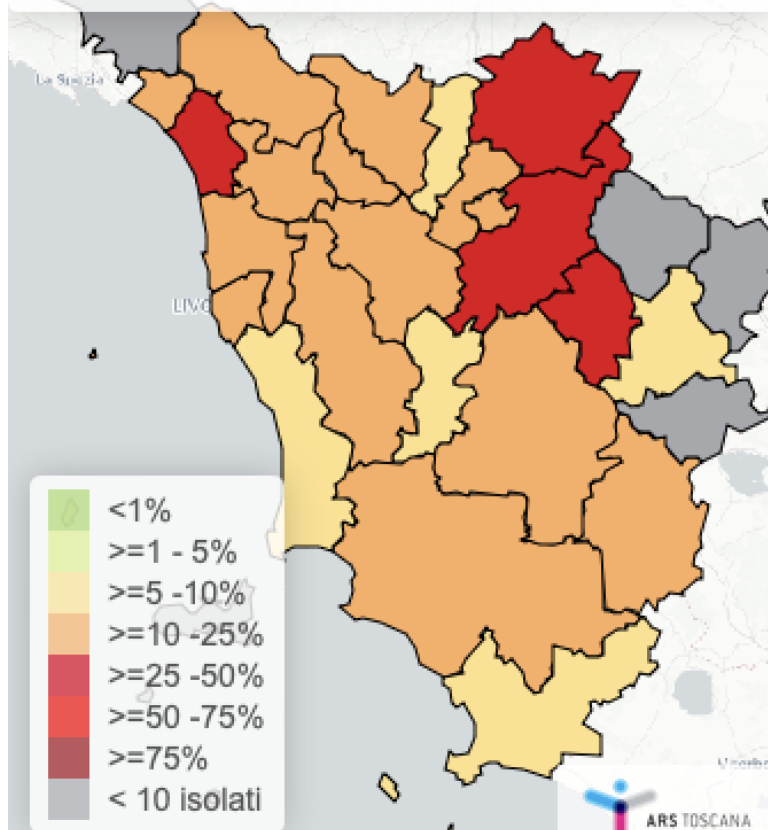
Principale meccanismo di resistenza : produzione carbapenemasi

Klebsiella pneumoniae: RESISTENZA a carbapenemi (2023)

Klebsiella pneumoniae resistente ai carbapenemi - Mappa per zona distretto

Rapporto (x 100) - Anno 2023 - Totale - Emocolture

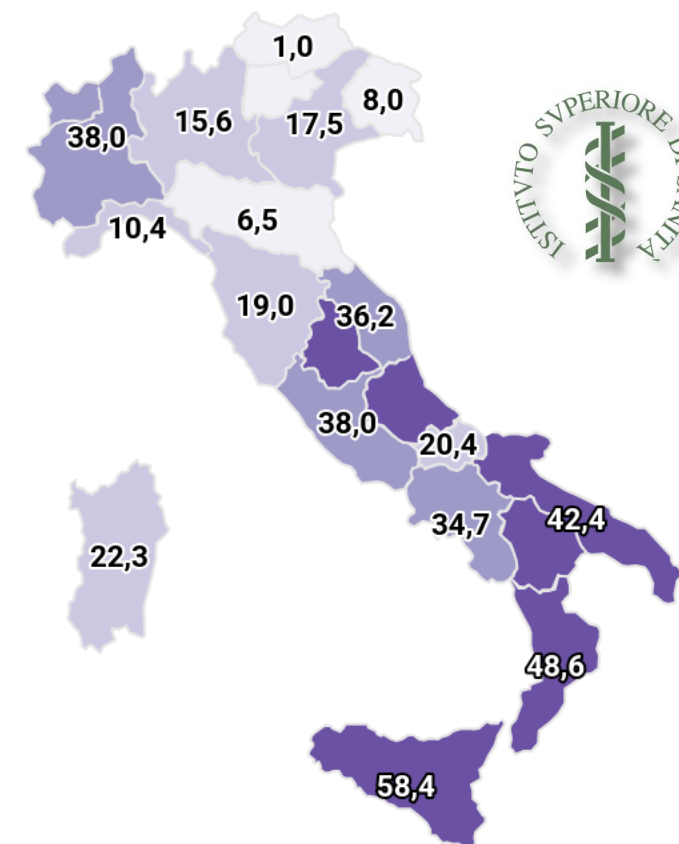
Fonte: ARS - Rete SMART



↑ **19.9%**

CRKP (%)

- 0-10,2
- 10,3-22,3
- 22,4-38,0
- 40,4-100

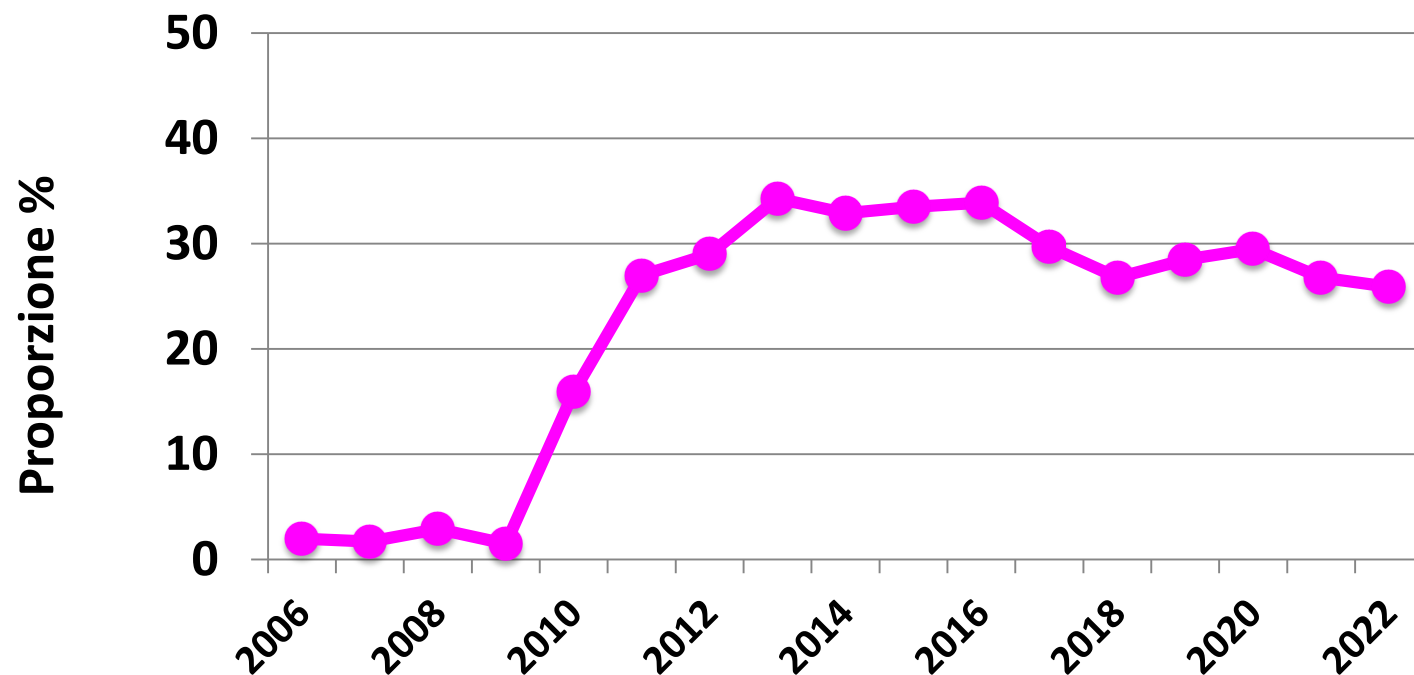


↑ **26.5%**

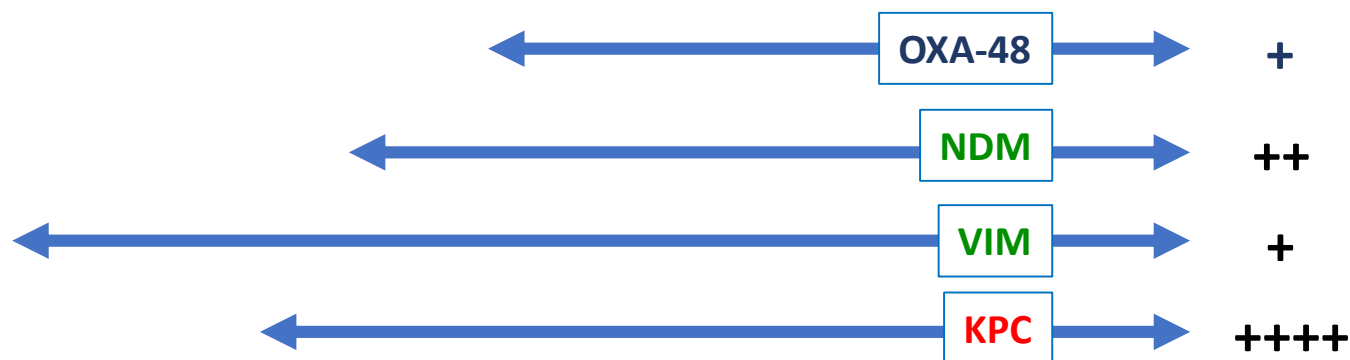
K. pneumoniae – resistenza a carbapenemi in Italia

Meccanismi di resistenza:

- Carbapenemasi, 88-98%
- Non-carbapenemasi, 2-12%



Impatto epidemiologico



Giani *et al* – Euro Surv 2013

Conte *et al* – JAC 2016

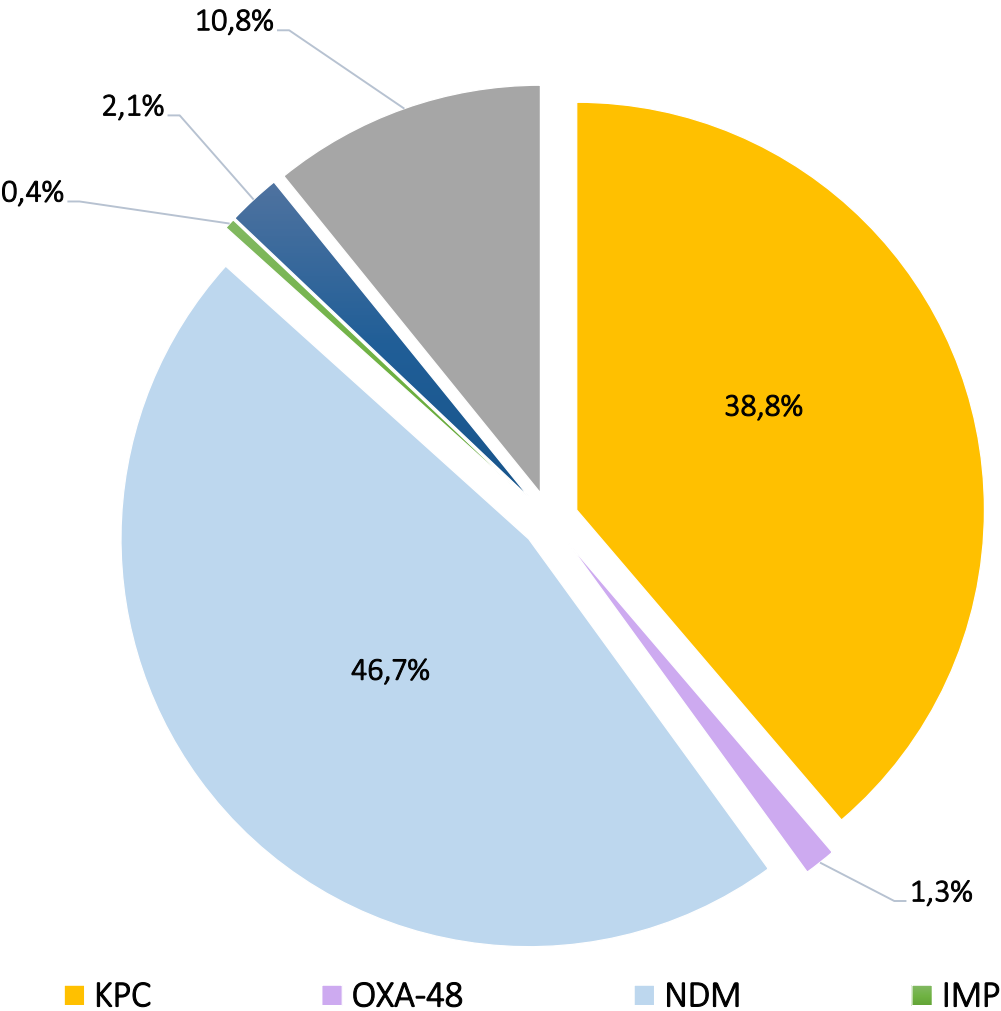
Giani *et al* – Euro Surv 2017

Grundmann *et al* – Lancet ID 2017

Di Pilato *et al* – JAC 2021

K. pneumoniae – resistenza a carbapenemi in Toscana

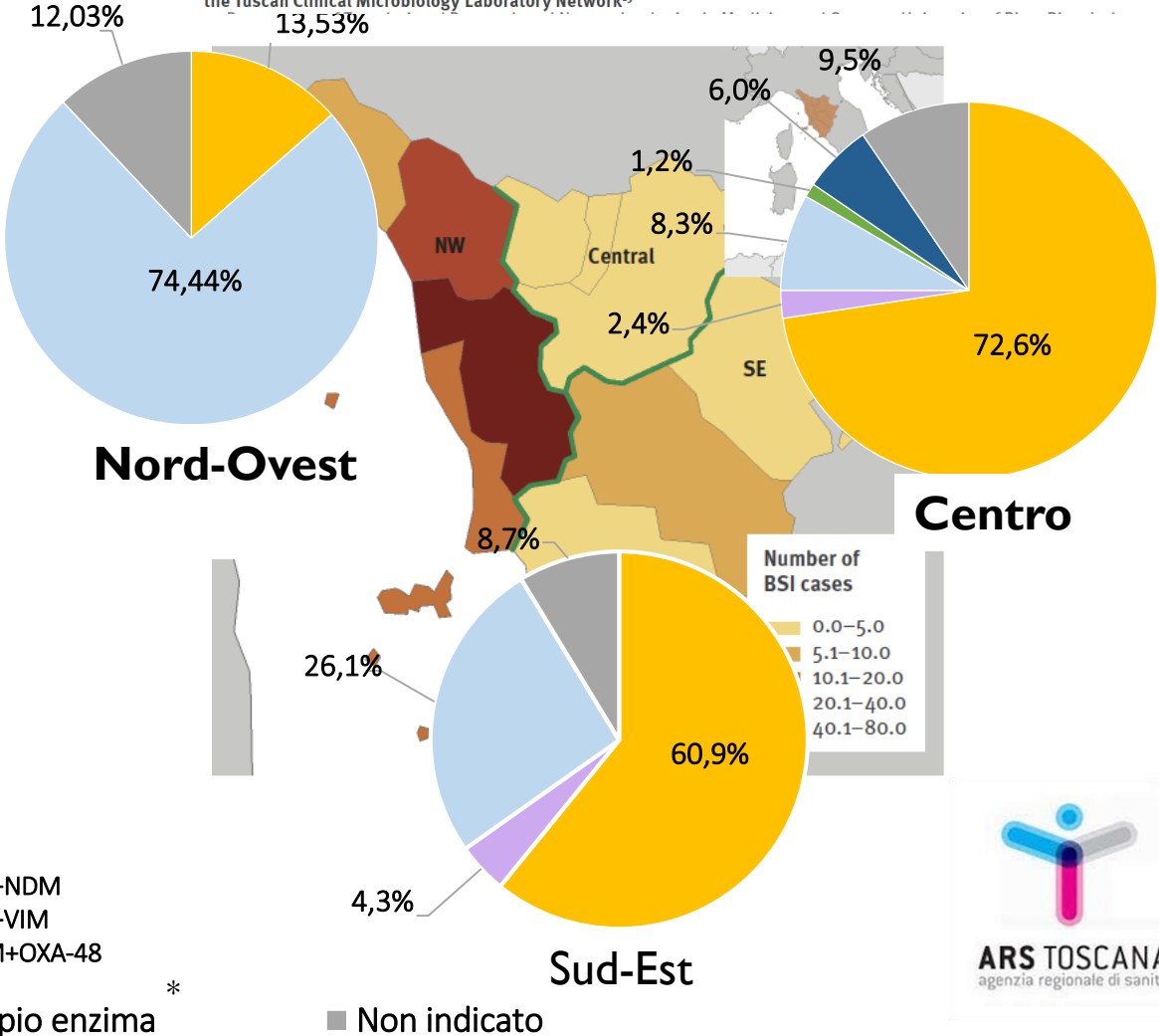
Tipi di carbapenemasi in batteriemie da CPE (Toscana, anno 2023)



RAPID COMMUNICATION

Prolonged outbreak of New Delhi metallo-beta-lactamase-producing carbapenem-resistant Enterobacterales (NDM-CRE), Tuscany, Italy, 2018 to 2019

Lara Tavoschi¹, Silvia Forni², Andrea Porretta^{4,5}, Lorenzo Righi³, Filippo Pieralli⁴, Francesco Menichetti⁵, Marco Falcone⁵, Giulia Gemignani⁵, Spartaco Sani⁶, Paola Vivani⁷, Tommaso Bellandi⁸, Danilo Tacconi⁹, Lucia Turini¹⁰, Giulio Toccafondi³, Gaetano Privitera^{4,5}, Pierluigi Lopalco^{4,5}, Angelo Baggiani^{1,5}, Fabrizio Gemmi², Grazia Luchini⁵, Maurizio Petrillo⁴, Lorenzo Roti¹⁰, Patrizio Pezzotti¹², Annalisa Pantosti¹², Stefania Iannazzo¹³, Maria Teresa Mechi³, Gian Maria Rossolini^{4,14}, on behalf of the Tuscan Clinical Microbiology Laboratory Network¹⁵



Attività dei nuovi farmaci nei confronti dei Gram-negativi carbapenemasi produttori

Spettro di attività

Più comuni patogeni MDR	CZA	MEV	IMR
Enterobatteri KPC			
Enterobatteri OXA-48			
Enterobatteri MBL			
<i>Pseudomonas</i> MBL			
<i>Acinetobacter</i> OXA			
<i>Acinetobacter</i> MBL			

CZA = ceftazidime/avibactam

MEV = meropenem/vaborbactam

IMR = imipenem/relebactam

Attività dei nuovi farmaci nei confronti dei Gram-negativi carbapenemasi produttori

Spettro di attività

! resistenze acquisite

Più comuni patogeni MDR	CZA	MEV	IMR
Enterobatteri KPC	!!	!	!
Enterobatteri OXA-48			
Enterobatteri MBL			
<i>Pseudomonas</i> MBL			
<i>Acinetobacter</i> OXA			
<i>Acinetobacter</i> MBL			

CZA = ceftazidime/avibactam

MEV = meropenem/vaborbactam

IMR = imipenem/relebactam

Ceftazidime/Avibactam: meccanismi di resistenza acquisita in Kp-KPC

- Varianti enzima KPC (e. g. KPC-31)
- Alterazione in porine ○ Produzione aumentata enzima **KPC**
(*ompK35/ompK36*)

Antibiotic	MIC mg/L (S/I/R)
Meropenem	64 R
CAZ-Avib	1 S
MER-Vabor	0.25 S
IMI-Releb	0.5 S
Cefiderocol	1 S

KPC-3

Antibiotic	MIC mg/L (S/I/R)
Meropenem	1 S
CAZ-Avib	>32 R
MER-Vabor	0.25 S
IMI-Releb	0.5 S
Cefiderocol	4 S

KPC-31

Antibiotic	MIC mg/L (S/I/R)
Meropenem	32 R
CAZ-Avib	>32 R
MER-Vabor	8 S
IMI-Releb	0.5 S
Cefiderocol	4 R

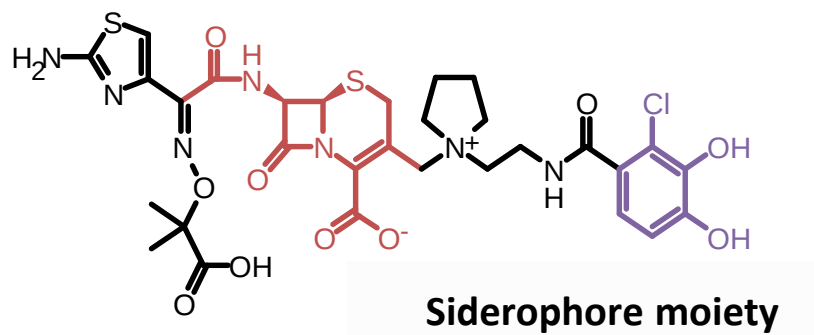
KPC-109

Antibiotic	MIC mg/L (S/I/R)
Meropenem	32 R
CAZ-Avib	>32 R
MER-Vabor	>32 R
IMI-Releb	>16 R
Cefiderocol	4 R

*ompK35*Δ,
*ompK36*_{137DT}, *bla*_{KPC} 6x

Prevalenza globale di resistenza al Cefiderocol

78 studi, 82 035 isolati clinici



Pathogen	Resistance rate (%)
Enterobacterales	3
Carba-R Enterobacterales	12.4
NDM Enterobacterales	38.8
CAZ-AVI-resistant Enterobacterales	36.6
<i>Acinetobacter baumannii</i>	8.8
Carba-R <i>A. baumannii</i>	13.2
NDM <i>A. baumannii</i>	44.7
<i>Pseudomonas aeruginosa</i>	1.4
Carba-R <i>P. aeruginosa</i>	3.5
MBL <i>P. aeruginosa</i>	1.8
NDM <i>P. aeruginosa</i>	22.9

K. pneumoniae NDM+ resistenti al cefiderocol

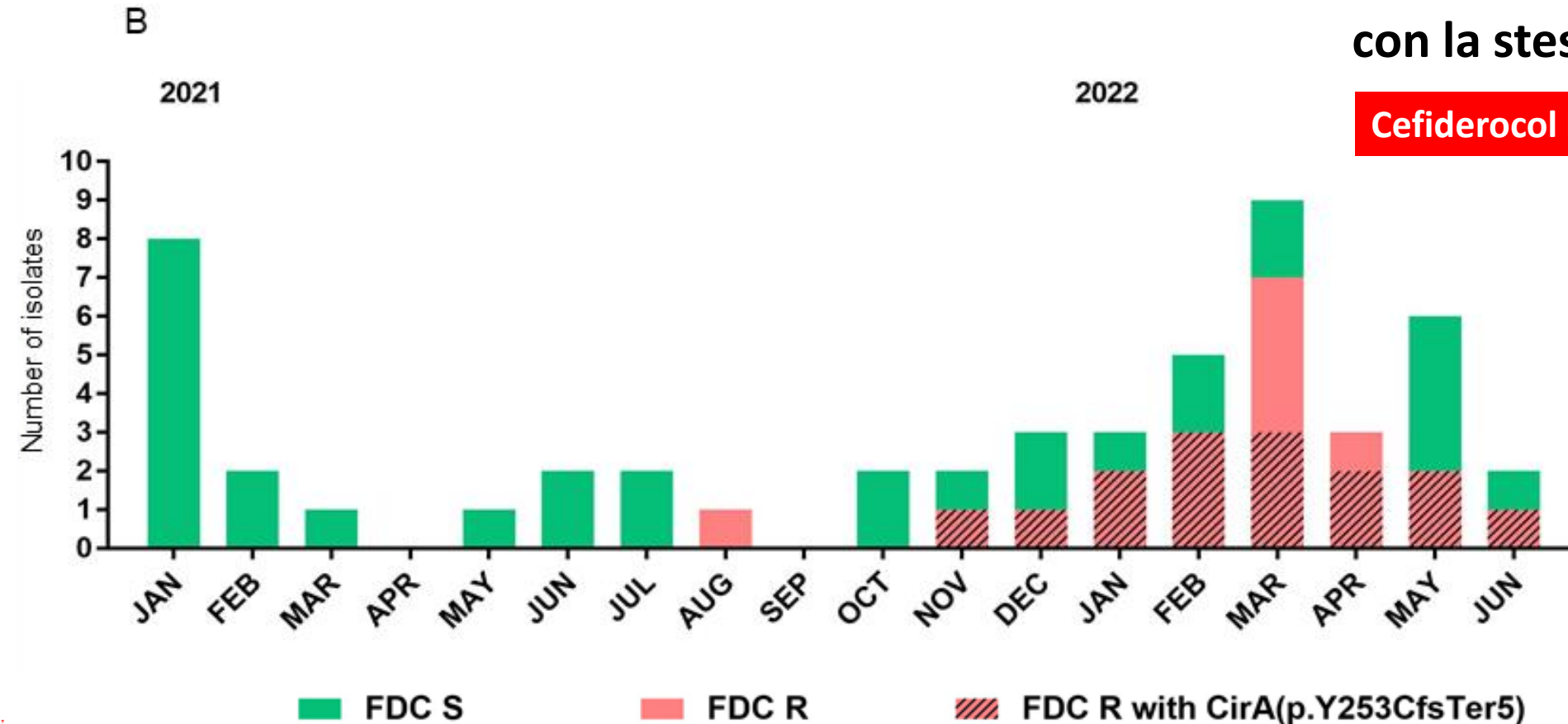
Nosocomial outbreak by NDM-1-producing *Klebsiella pneumoniae* highly resistant to cefiderocol, Florence, Italy, August 2021 to June 2022

Marco Coppi^{1,2}, Alberto Antonelli^{1,2}, Claudia Niccolai¹, Andrea Bartolini¹, Laura Bartolini², Maddalena Grazzini³, Elisabetta Mantengoli^{3,4}, Alberto Farese⁴, Filippo Pieralli⁵, Maria Teresa Mechi³, Vincenzo Di Pilato^{2,6}, Tommaso Giani^{1,2}, Gian Maria Rossolini^{1,2} Eurosurveillance, 2022

21 casi NDM-Kp cefiderocol-R
- 12 colonizzazioni
- 9 infezioni (BSI, UTI, LRTI)

**15 casi dello stesso clone ST147
con la stessa mutazione Δ CirA**

Cefiderocol MIC, >32 mg/L



Conclusioni

- La resistenza resta un problema maggiore con molti patogeni batterici, soprattutto Gram-negativi
- Negli Enterobatteri problemi importanti di resistenza alle cefalosporine di terza generazione e carbapenemi (*K. pneumoniae*)
- Problemi di resistenza emergenti anche con i nuovi farmaci anti-Gram-negativi (vari meccanismi, variabile cross-resistenza)
- Evoluzione della resistenza: necessità di sorveglianza (anche molecolare) continua e capillare



UNIVERSITÀ
DEGLI STUDI
FIRENZE

GRAZIE
per
L' ATTENZIONE

tommaso.giani@unifi.it