XXV JORNADAS CIENTÍFICAS DE ANÁLISES CLÍNICAS E GENÉTICA HUMANA

Resistência Antimicrobiana – Desafios e novas opções

Cátia Caneiras

Instituto Saúde Ambiental, Faculdade de Medicina da Universidade de Lisboa

Egas Moniz School of Health & Science

06/02/2026

Resistência Antimicrobiana – Desafios e novas opções

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Deal on comprehensive reform of EU pharmaceutical legislation

Press Releases SANT 11-12-2025 - 05:47

- Promoting innovation and increasing access to medicinal products across the EU
- Combatting antimicrobial resistance
- Optimising European Medicines Agency's structure and simplifying regulatory procedures
- Improving monitoring and management of shortages

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Resistência Antimicrobiana – Desafios e novas opções

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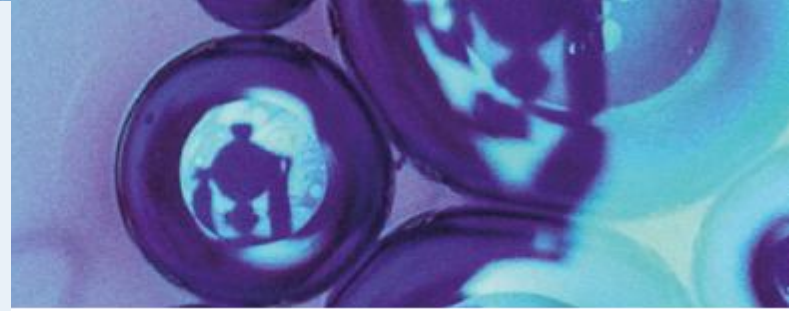
Antimicrobial resistance research priorities



Prevention

1. Investigate the impact and contribution of community WASH and waste management interventions on the burden and drivers of antimicrobial resistance
2. Investigate implementation strategies and the impact of WASH-related interventions in health-care settings on the burden of health care-associated infections and antimicrobial medicine prescribing
3. Identify (cost-)effective, acceptable and feasible multimodal IPC strategies and the relative effect of their components on reducing health care-associated infections
4. Assess the impact of vaccines on colonization and infection by resistant pathogens and on reducing the use of antimicrobial medicines, health-care encounters and health system costs

Diagnosis

5. Investigate and evaluate rapid point-of-care tests to discriminate between bacterial versus non-bacterial infections
6. Investigate and evaluate diagnostic tests for detecting pathogens and antimicrobial susceptibility testing
7. Investigate and evaluate rapid antimicrobial susceptibility testing methods from blood cultures
8. Investigate and evaluate diagnostic tests for detecting fungal pathogens
9. Investigate the clinical and diagnostic value of phenotypic antifungal susceptibility testing
10. Investigate and evaluate novel rapid point-of-care assays and optimal testing approaches for (resistant) *Neisseria gonorrhoea*

Treatment and care

11. Investigate antimicrobial stewardship interventions that are context specific, feasible, available, effective and cost-effective in outpatient and inpatient settings
12. Identify feasible, effective and scalable pharmacist dispensing practices for antimicrobial medicines along with related regulatory frameworks to improve antimicrobial stewardship in the community, especially in low- and middle-income countries
13. Investigate criteria and strategies to optimize empirical antimicrobial therapy for the main infectious syndromes, especially in settings with limited access to medicine, diagnostic capacity and health-care services
14. Determine optimal methods, metrics and targets to monitor antimicrobial use
15. Determine the patterns and drivers of appropriate and inappropriate prescribing and use of antibiotics
16. Investigate approaches to effectively use data on antimicrobial use and AMR surveillance to inform antimicrobial stewardship and guidelines
17. Investigate antibiotic treatment regimens for infections, especially for extended-spectrum beta-lactamase-producing and carbapenem-resistant Enterobacterales
18. Investigate antibiotic treatment regimens for infections by drug-resistant typhoid and non-typhoidal salmonellae
19. Investigate empirical antibiotic treatments for gram-negative bacteria causing bloodstream infections among newborns and young children in settings with high AMR prevalence
20. Investigate antifungal regimens for infections caused by WHO fungal priority pathogens critically important for AMR
21. Investigate regimens for urogenital and extragenital STIs in the context of increasing AMR

Cross-cutting

22. Investigate the epidemiology, mortality, morbidity and impact of infections caused by resistant WHO bacterial priority pathogens
23. Investigate the epidemiology, morbidity, mortality and impact of infections by resistant WHO fungal priority pathogens critically important for AMR
24. Investigate factors driving colonization and infection by resistant WHO bacterial priority and fungal pathogens
25. Identify optimal surveillance methods to generate accurate and reliable data on the epidemiology and burden of AMR
26. Assess how mass administration of antimicrobial medicines affects AMR
27. Evaluate how currently recommended syndromic STI management and treatment of people with asymptomatic STIs affect antibiotic prescribing and AMR
28. Determine the most (cost-)effective behavioural change interventions to mitigate the emergence and spread of AMR
29. Evaluate the implementation of AMR-related policies and regulations and how effective they are in mitigating AMR and improving health outcomes
30. Investigate implementation strategies for national policies, legislation and regulations to improve infection prevention, patient care and the use of antimicrobial medicines
31. Identify the most (cost-)effective interventions and an investment case to mitigate AMR globally and across countries
32. Investigate strategies to integrate AMR interventions into broader health, health financing, development and welfare structures and evaluate their impact
33. Investigate how regulatory frameworks, marketing incentives and financing models affect the sustainable development, availability, equitable access and use of new antimicrobial medicines

Antimicrobial-resistant bacterial and fungal infections

- Testes POC “point of care”: bactéria Vs não bactéria
- Detetar microrganismo + TSA
- Rápido TSA – infeções corrente sanguínea
- Detetar fungos
- TSA – Fungos

- Otimizar Terapêutica Empírica

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FIP Antimicrobial Resistance (AMR) Regional Roadmaps 2024-2028

For FIP regional forums and FIP member organisations in Europe

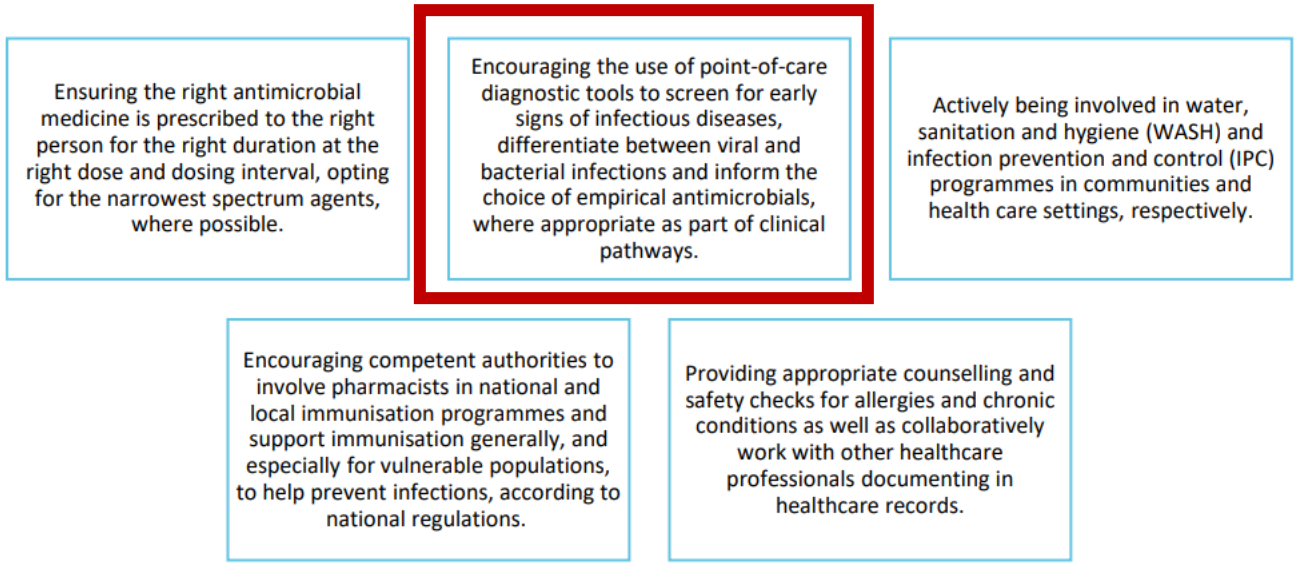
2024

FIP Development Goals

2.4 European Region

As explained earlier in the document, FIP does not have a regional forum in the WHO European Region. Instead, a total of 17 responses were received from the FIP member organisations in the European Region. Figure 4 demonstrates the top priorities for pharmacists and policy makers to be implemented in the next 2024-2028 term.

Figure 4: Top AMR and AMS priorities that pharmacists should implement in the next four years (2024-2028) in the European Region



https://www.fip.org/antimicrobial-resistance

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WHO Bacterial Priority Pathogens, 2024

World Health Organization

Health Topics | Countries | Newsroom | Emergencies | Data | About WHO

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WHO bacterial priority pathogens list, 2024: Bacterial pathogens of public health importance to guide research, development and strategies to prevent and control antimicrobial resistance

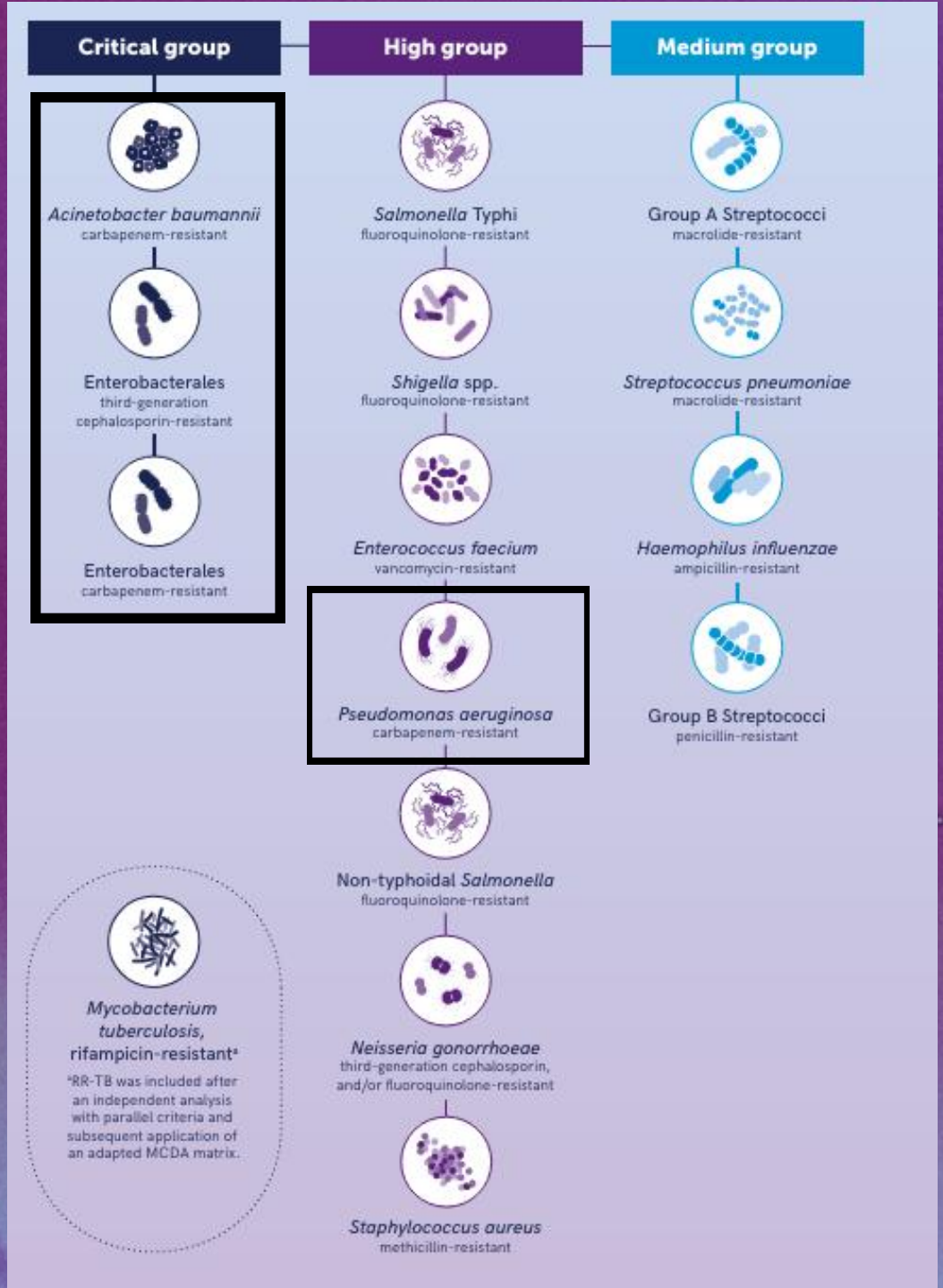
WHO bacterial priority pathogens list, 2024: Bacterial pathogens of public health importance to guide research, development and strategies to prevent and control antimicrobial resistance

17 May 2024 | Report

Gram-negative Carbapenem-resistant

ERC – Enterobacterales **resistentes** aos carbapenemos

EPC – Enterobacterales produtores de carbapenemases



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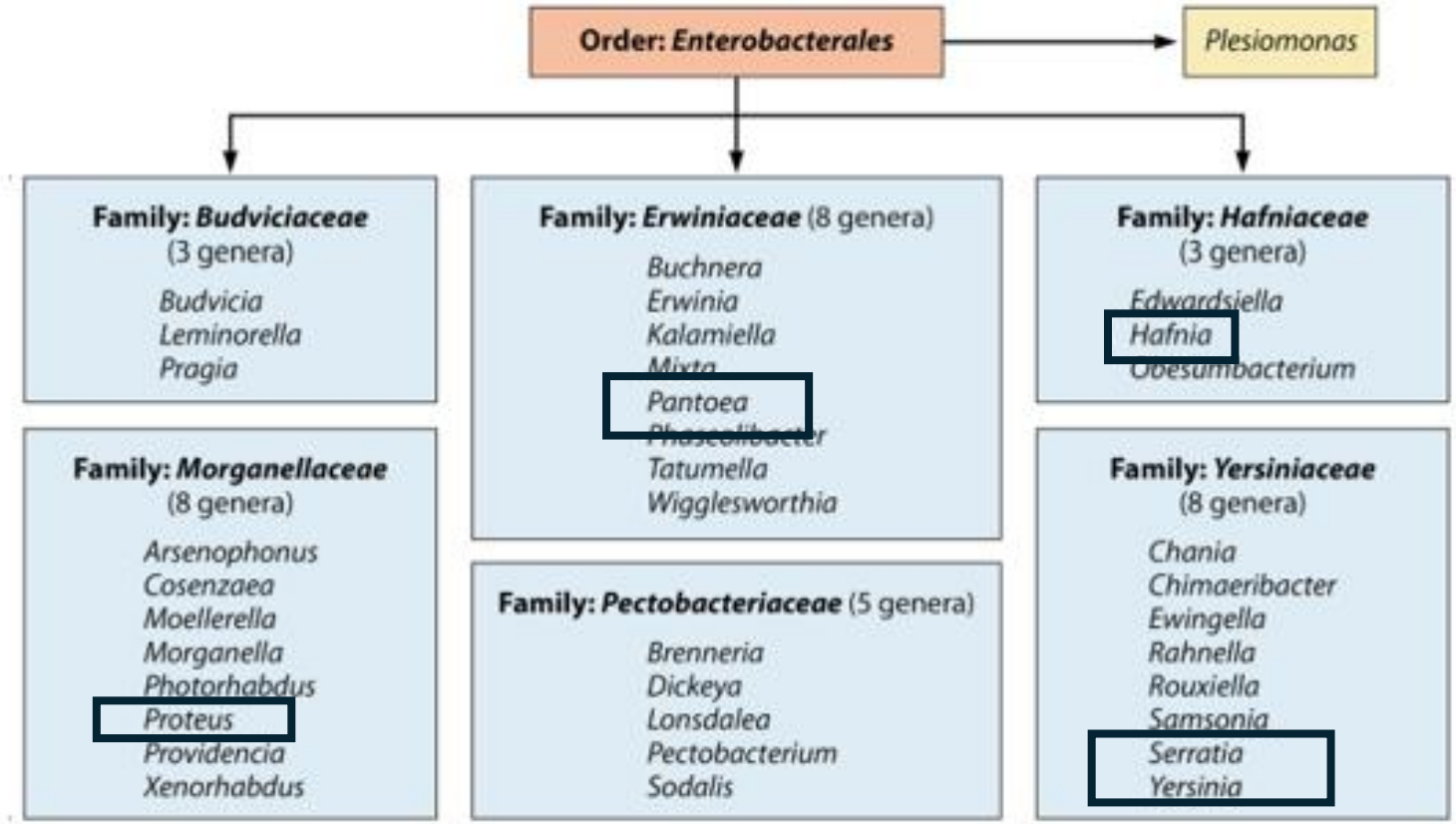
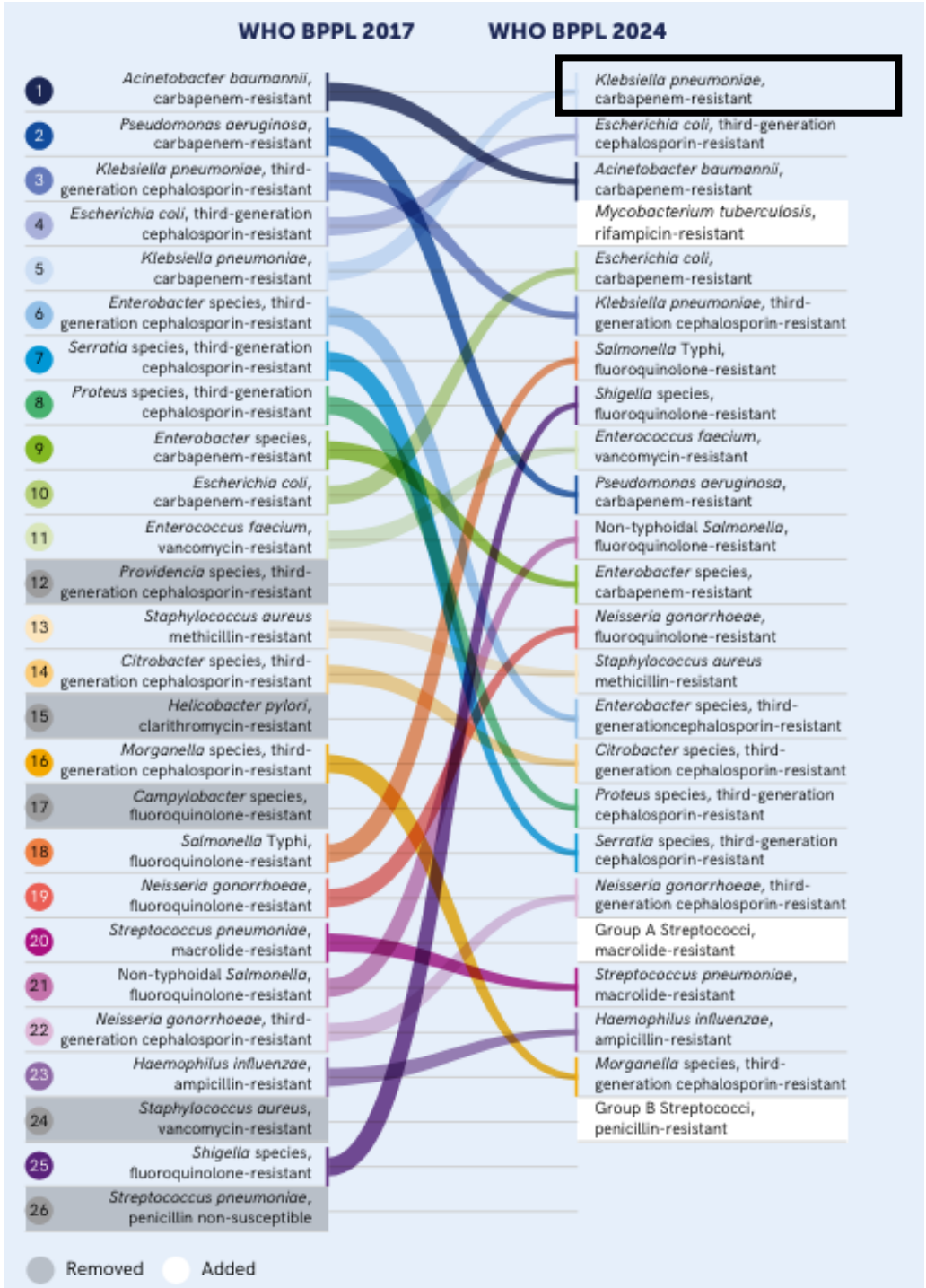
Order: *Enterobacterales*

Family: *Enterobacteriaceae* (33 genera)

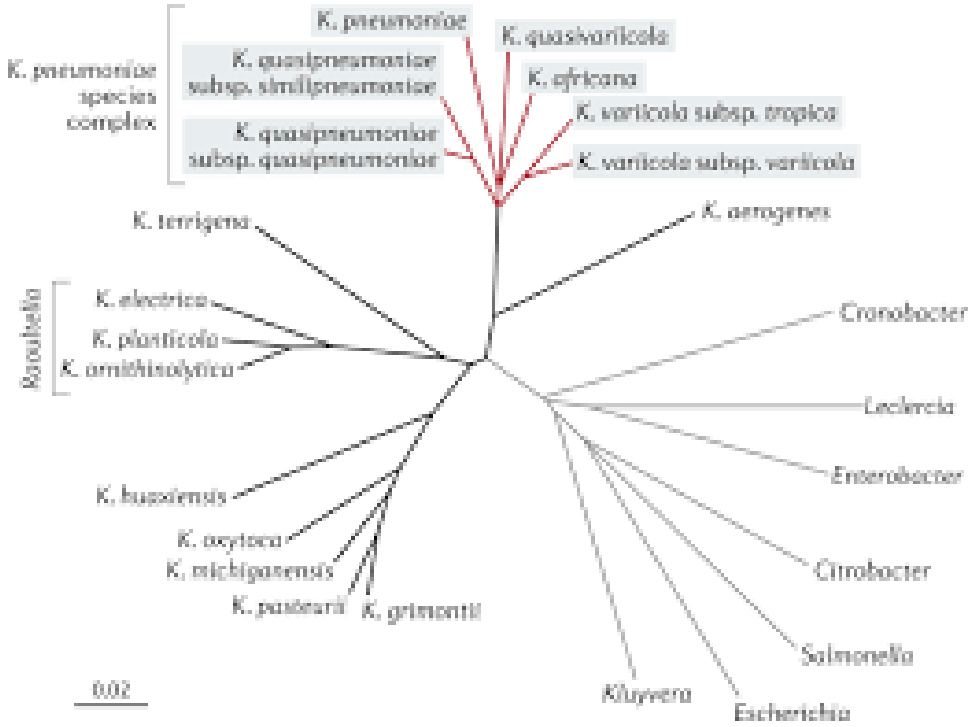
Biostraticola
Buttiauxella
Cedecea
Citrobacter
Enterobacillus
Enterobacter
Escherichia
Franconibacter
Gibbsiella
Intestinirhabdus
Izhakiella
Klebsiella
Kluyvera
Kosakonia
Leclercia
Lelliottia
Limnobaculum
Mangrovibacter
Metakosakonia
Phytobacter
Pluralibacter
Pseudescherichia
Pseudocitrobacter
Raoultella
Rosenbergiella
Saccharobacter
Salmonella
Scandinavium
Shigella
Shimwellia
Siccibacter
Trabulsiella
Yokenella





Klebsiella pneumoniae **carbapenem-resistant**

Resistência Antimicrobiana



Complexo de espécies de *Klebsiella*

Wyres, K.L., Lam, M.M.C. & Holt, K.E. Population genomics of *Klebsiella pneumoniae*. *Nat Rev Microbiol* **18**, 344–359 (2020).

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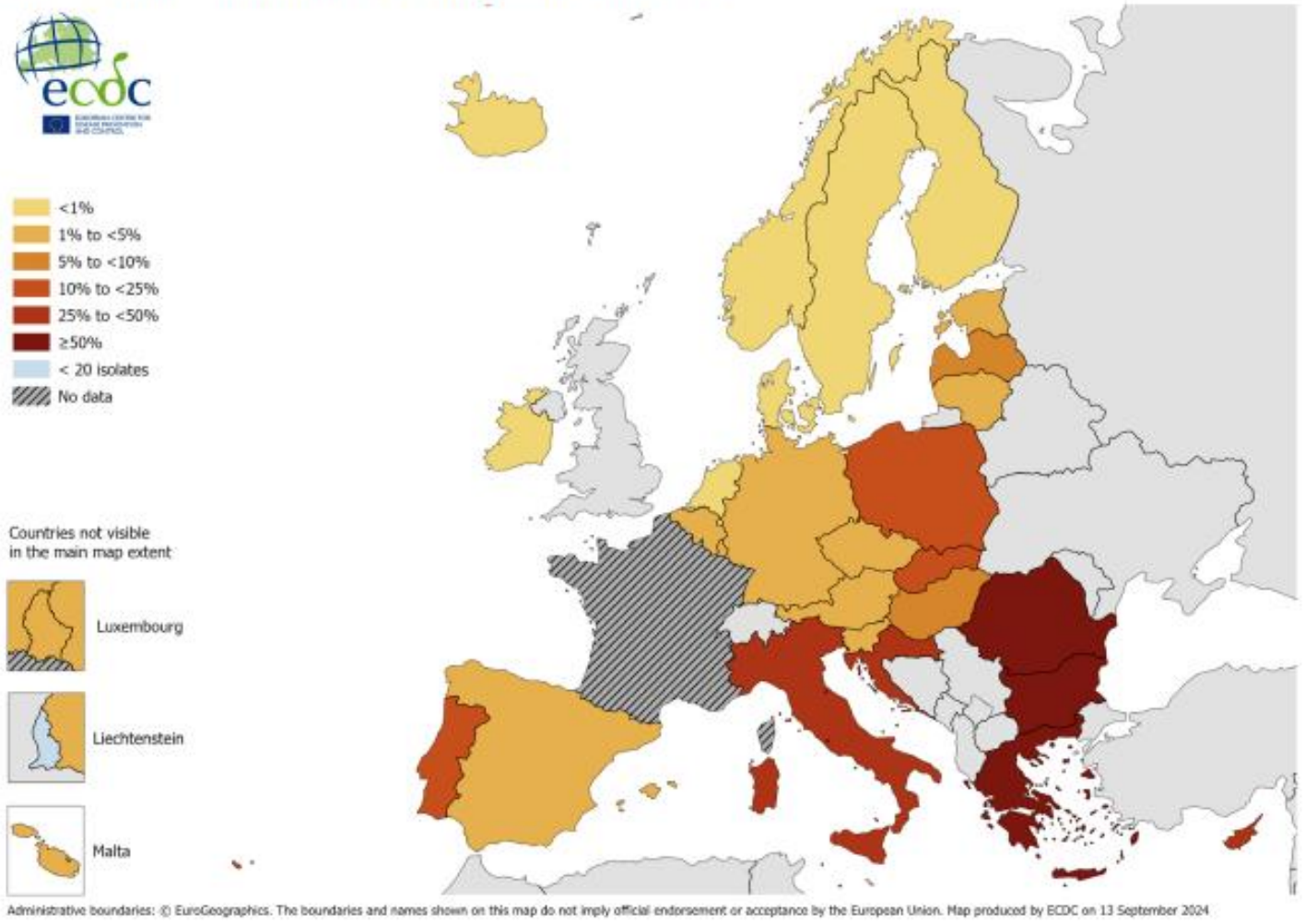
Figure 5. *Klebsiella pneumoniae*. Percentage of invasive isolates resistant to carbapenems (imipenem/meropenem), by country, EU/EEA, 2023



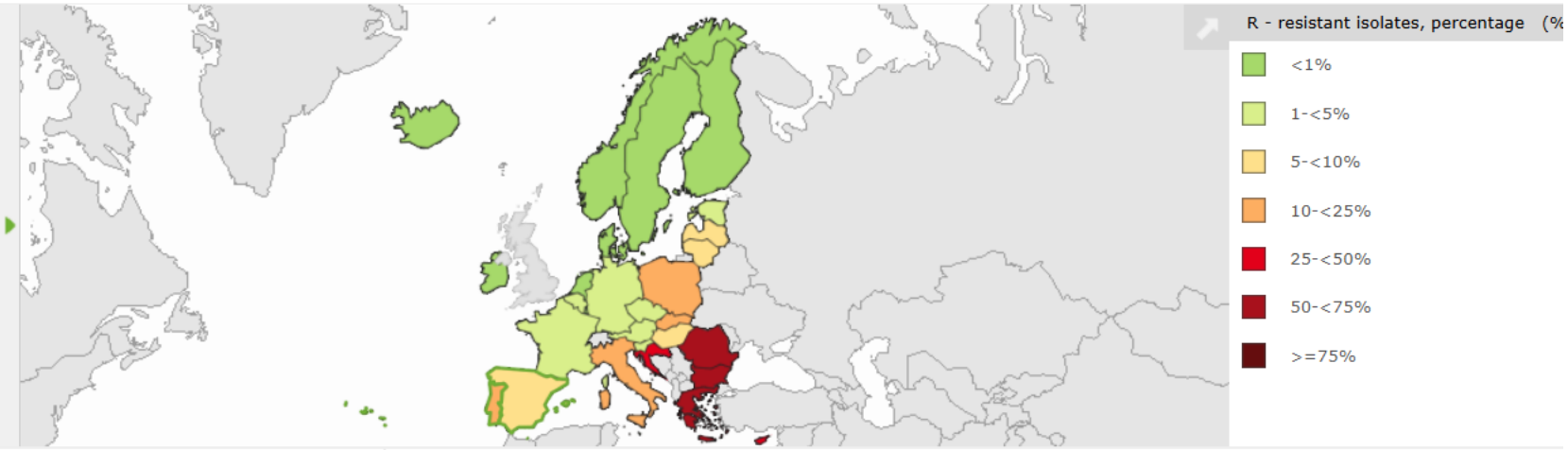
Antimicrobial resistance in the EU/EEA (EARS-Net) Annual Epidemiological Report for 2023. https://www.ecdc.europa.eu

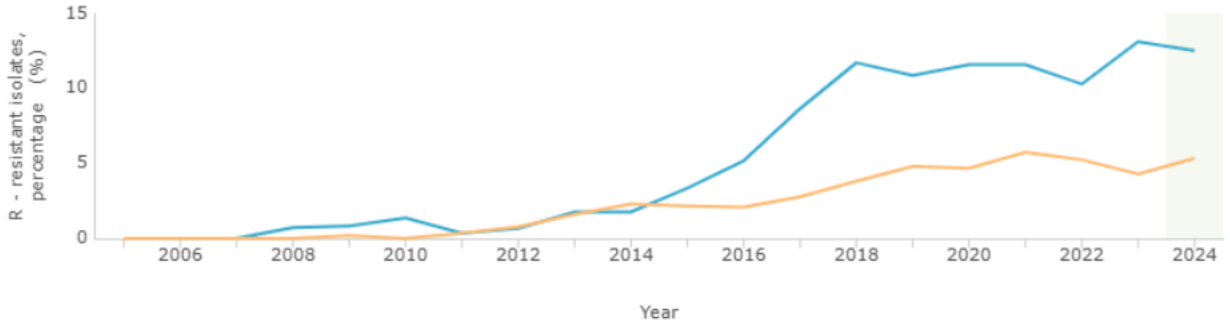
PROD

Surveillance Atlas of Infectious Diseases

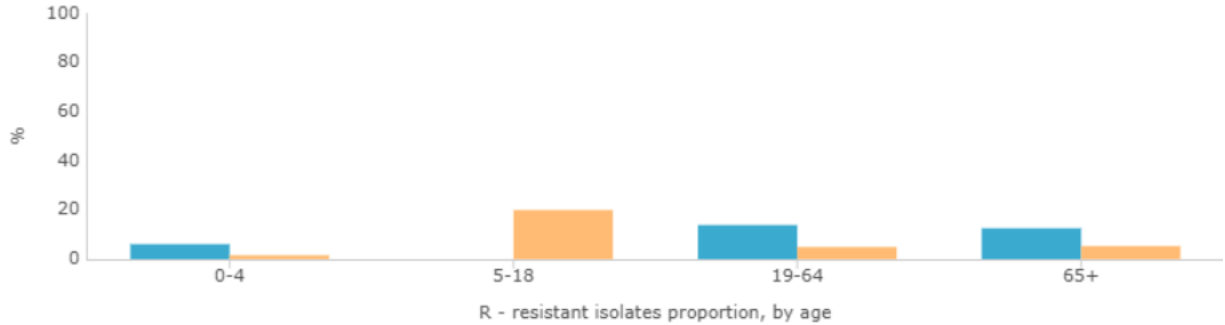
Antimicrobial resistance | Klebsiella pneumoniae | Carbapenems | R - resistant isolates, percentage | 2024

Region	R - resistant isolates, percentage (%)
Luxembourg	0.7
Malta	2.8
Netherlands	0.8
Norway	0.8
Poland	18.9
Portugal	12.5
Romania	50.3
Slovakia	13.1
Slovenia	3.7
Spain	5.3
Sweden	0.5





R - resistant isolates proportion, by age | Bar



Portugal Spain

Manage cookie

https://atlas.ecdc.europa.eu

Table A3.1. Summary results of bacterial pathogens assessments using Multiple Criteria Decision Analysis (MCDA)

Pathogen/Criterion	Mortality	Incidence	Non-fatal burden	Trend of resistance	Transmissibility	Preventability	Treatability	Pipeline
Acinetobacter baumannii, carbapenem-resistant	High	Medium	Medium	Level 3	Low-medium	Medium-low	Low	Unlikely
Pseudomonas aeruginosa, carbapenem-resistant	High	Medium	Medium	Level 1	Medium	Medium-low	Medium-low	Unlikely
Klebsiella pneumoniae, carbapenem-resistant	High	Medium	Medium	Level 5	Medium-high	Medium-low	Medium-low	Unlikely
Escherichia coli, carbapenem-resistant	Medium-high	Medium-high	Medium-high	Level 3	Medium-high	Medium-low	Medium-low	Possible
Enterobacter spp., carbapenem-resistant	High	Low-medium	Low-medium	Level 4	Low-medium	Medium-low	Medium-low	Possible
Escherichia coli, third-generation cephalosporin-resistant	Medium	High	High	Level 5	High	Low	Medium	Possible
Klebsiella pneumoniae, third-generation cephalosporin-resistant	Medium-high	Medium-high	Medium	Level 3	High	Low	Medium	Possible
Proteus spp., third-generation cephalosporin-resistant	Medium	Low-medium	Low-medium	Level 2	Low-medium	Low	Medium	Likely
Morganella spp., third-generation cephalosporin-resistant	Low-medium	Low	Low	Level 2	Low-medium	Low	Medium	Likley
Citrobacter spp., third-generation cephalosporin-resistant	Medium	Low-medium	Low	Level 2	Medium	Low	Medium	Possible
Serratia spp., third-generation cephalosporin-resistant	Medium	Low-medium	Low	Level 2	Medium	Low	Medium	Likely
Enterobacter spp., third-generation cephalosporin-resistant	Medium	Medium	Low-medium	Level 2	Medium	Low	Medium	Likely
Enterococcus faecium, vancomycin-resistant	Medium-high	Low-medium	Low-medium	Level 3	High	Low	Medium	Unlikely
Staphylococcus aureus, methicillin-resistant	Medium-high	High	High	Level 1	High	Medium	High	Unlikely
Salmonella Typhi, fluoroquinolone-resistant	Medium	Low-medium	Medium	Level 5	Medium-high	Medium	Low-medium	Unlikely
Shigella spp., fluoroquinolone-resistant	Low-medium	Medium-high	Medium-high	Level 5	High	Low-medium	Medium-high	Unlikely
Non-typhoidal *Salmonella*, fluoroquinolone-resistant	Low	High	Medium-high	Level 5	High	Low	Medium-high	Possible
Neisseria gonorrhoeae, third-generation cephalosporin-resistant	Low	Low-medium	Low	Level 1	Medium	Low-medium	Low-medium	Unlikely
Neisseria gonorrhoeae, fluoroquinolone-resistant	Low	High	Medium	Level 4	Medium	Low-medium	Medium	Unlikely
Haemophilus influenzae, ampicillin-resistant	Medium	Low-medium	Low-medium	Level 2	Low-medium	High	Medium-high	Unlikely
Group A Streptococci, macrolide-resistant	Low	High	Medium	Level 4	Low-medium	Medium	High	Possible
Group B Streptococci, penicillin-resistant	Low-medium	Low	Low	Level 4	Low	Medium-high	Medium-high	Possible
Streptococcus pneumoniae, macrolide-resistant	Medium	Medium-high	High	Level 2	Medium-low	Medium-high	High	Likely
Mycobacterium tuberculosis, rifampicin-resistant[a]	Medium-high	Low	High	Level 3	Medium	Low	Low	Unlikely

[a] RR-TB was included after an independent analysis with parallel criteria and subsequent application of an adapted MCDA matrix.

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Enterobacter spp., carbapenem-resistant	High	Low-medium	Low-medium	Level 4	Low-medium	Medium-low	Medium-low	Possible
Escherichia coli, third-generation cephalosporin-resistant	Medium	High						
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Proteus spp., third-generation cephalosporin-resistant	Medium	Low-mediu						
Morganella spp., third-generation cephalosporin-resistant	Low-medium	Low						
Citrobacter spp., third-generation cephalosporin-resistant	Medium	Low-mediu						
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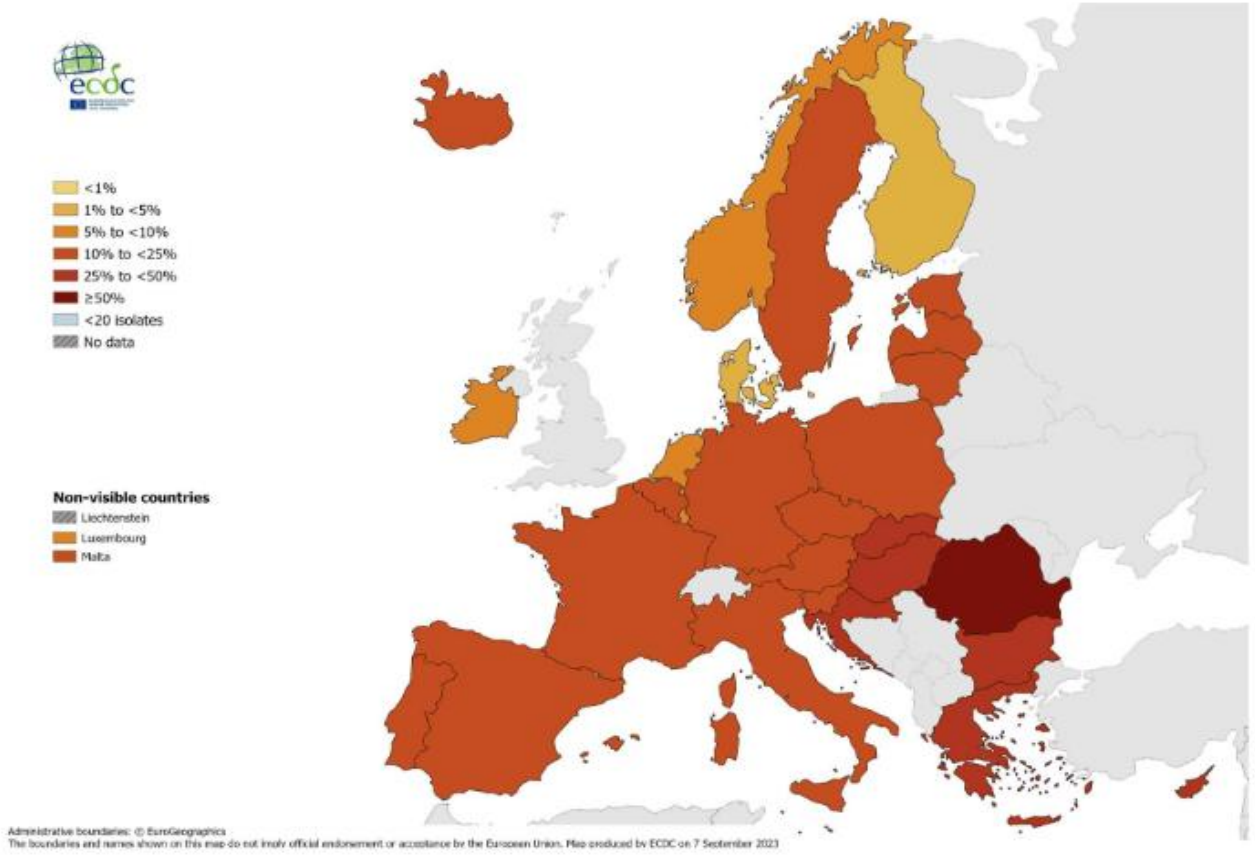
Streptococcus pneumoniae, macrolide-resistant	Medium	Medium-hi						
Mycobacterium tuberculosis, rifampicin-resistant[a]	Medium-high	Low						

[a] RR-TB was included after an independent analysis with parallel criteria and subsequent application of ar

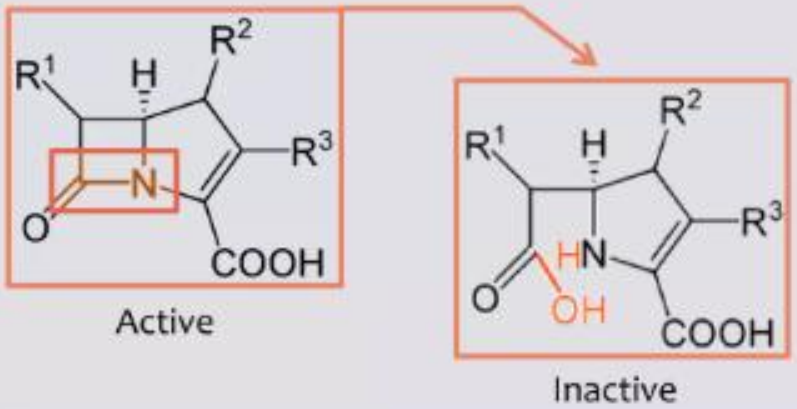
Figure 6. *Pseudomonas aeruginosa*. Percentage of invasive isolates with resistance to carbapenems (imipenem/meropenem), by country, EU/EEA, 2022



Carbapenem resistance

Carbapenemases

- β-Lactamases
- Hydrolyze penicillins, cephalosporins, monobactams, and carbapenems.



Active

Inactive

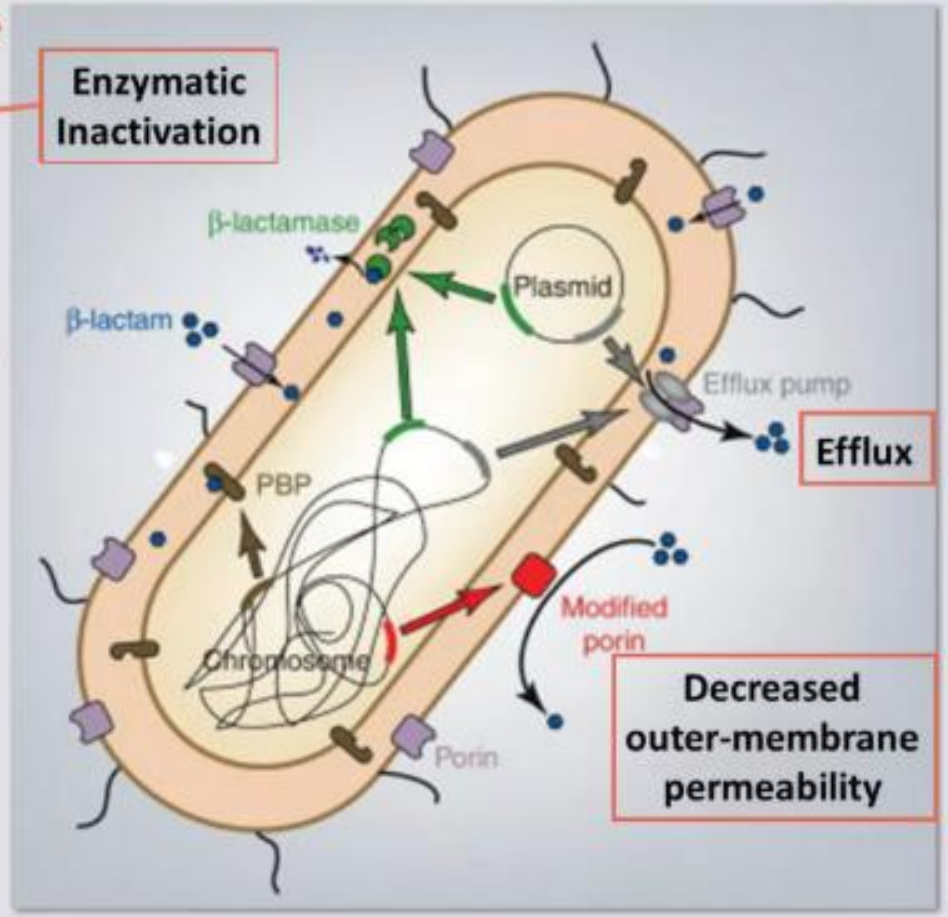
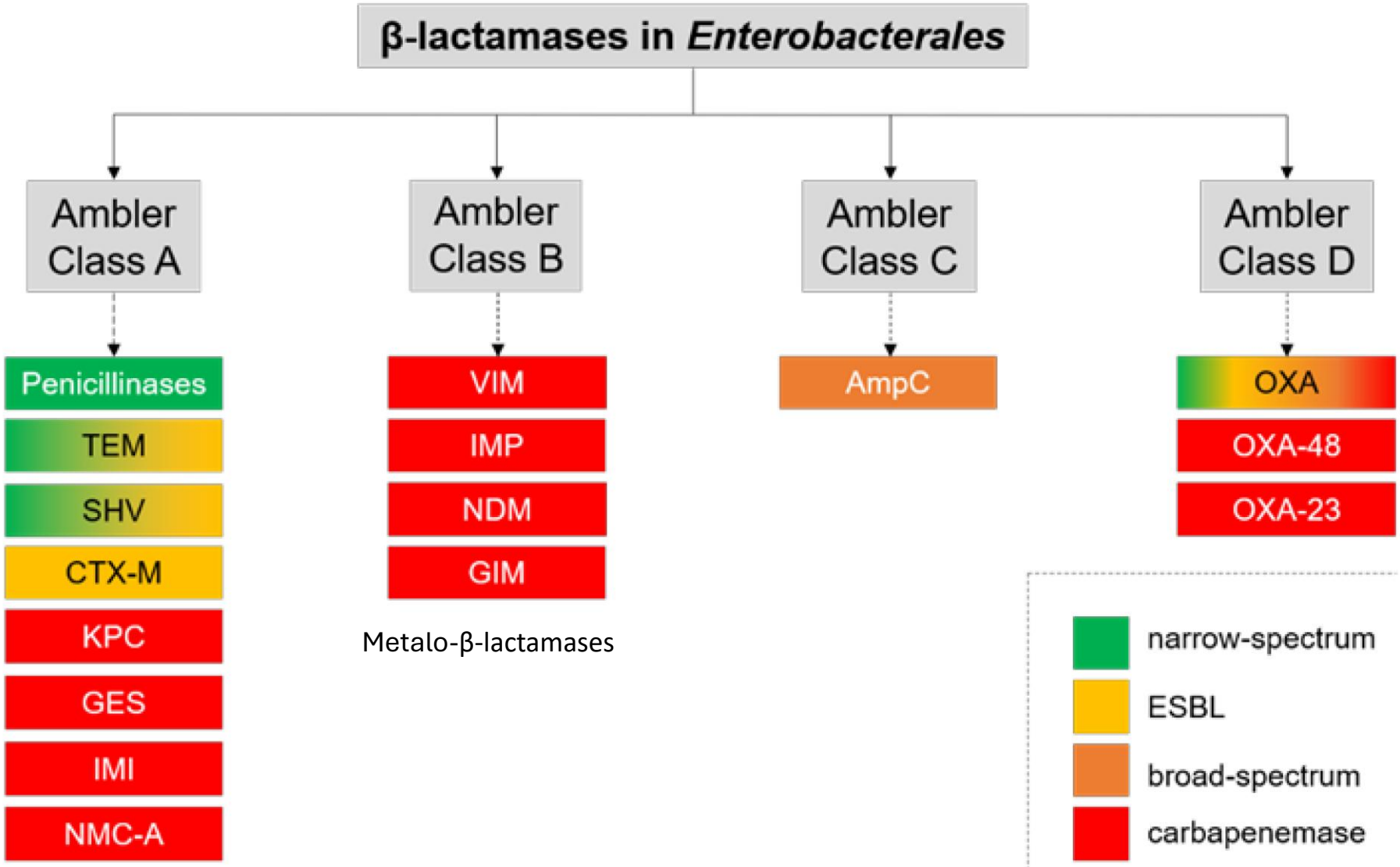


Image Source: Trends in Molecular Medicine



Metalo-β-lactamases

CPKp in Portugal:

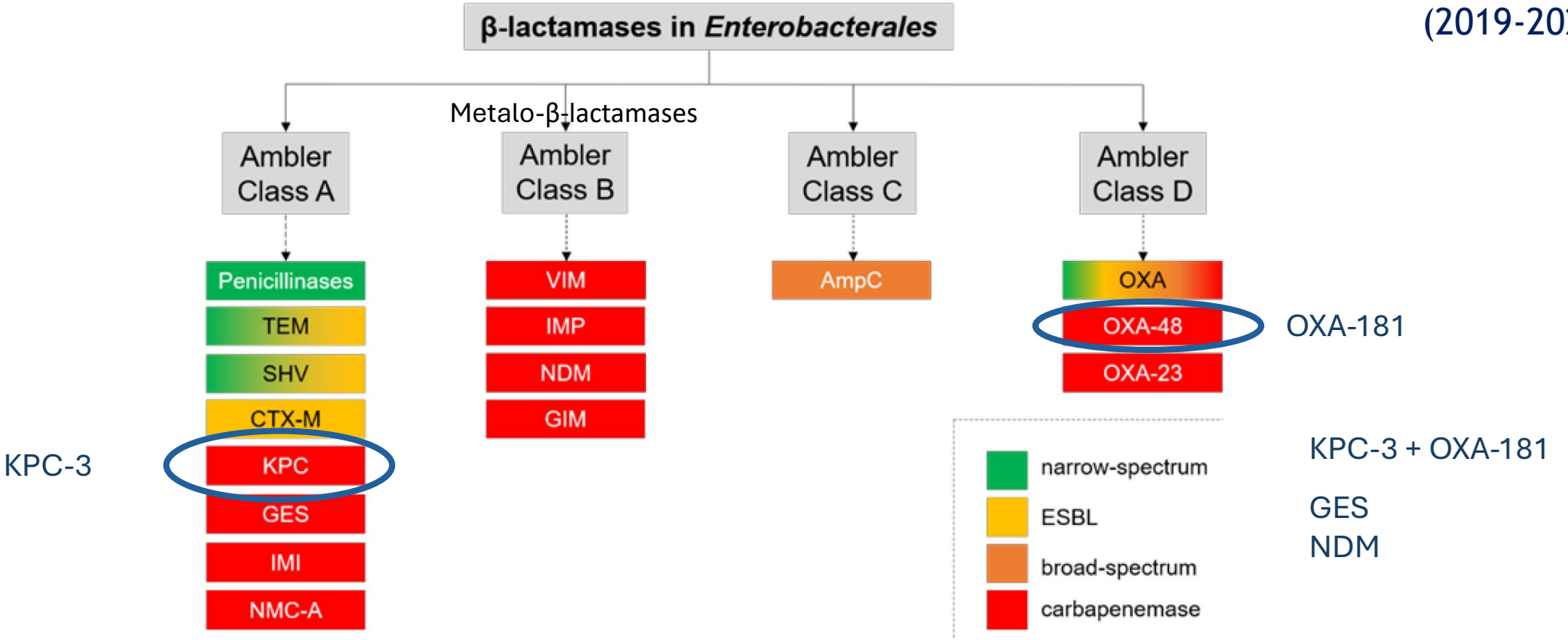
microorganisms MDPI

Article

Whole-Genome Sequencing Enables Molecular Characterization of Non-Clonal Group 258 High-Risk Clones (ST13, ST17, ST147 and ST307) among Carbapenem-Resistant *Klebsiella pneumoniae* from a Tertiary University Hospital Centre in Portugal

Gabriel Mendes [1], João F. Ramalho [1], Ana Bruschy-Fonseca [2], Luís Lito [2], Aida Duarte [3,4], José Melo-Cristino [2,5] and Cátia Caneiras [1,3,6,*]

(2019-2021)



KPC-3

OXA-181

KPC-3 + OXA-181

GES

NDM

Noster, J. *et al*. *Antibiotics* 2021, *10*, 1140

Mendes G et al. Microorganisms. 2022;10(2):416

Dissemination of carbapenemases – Analysis of **827 carbapenemase-producing ECC isolates.**

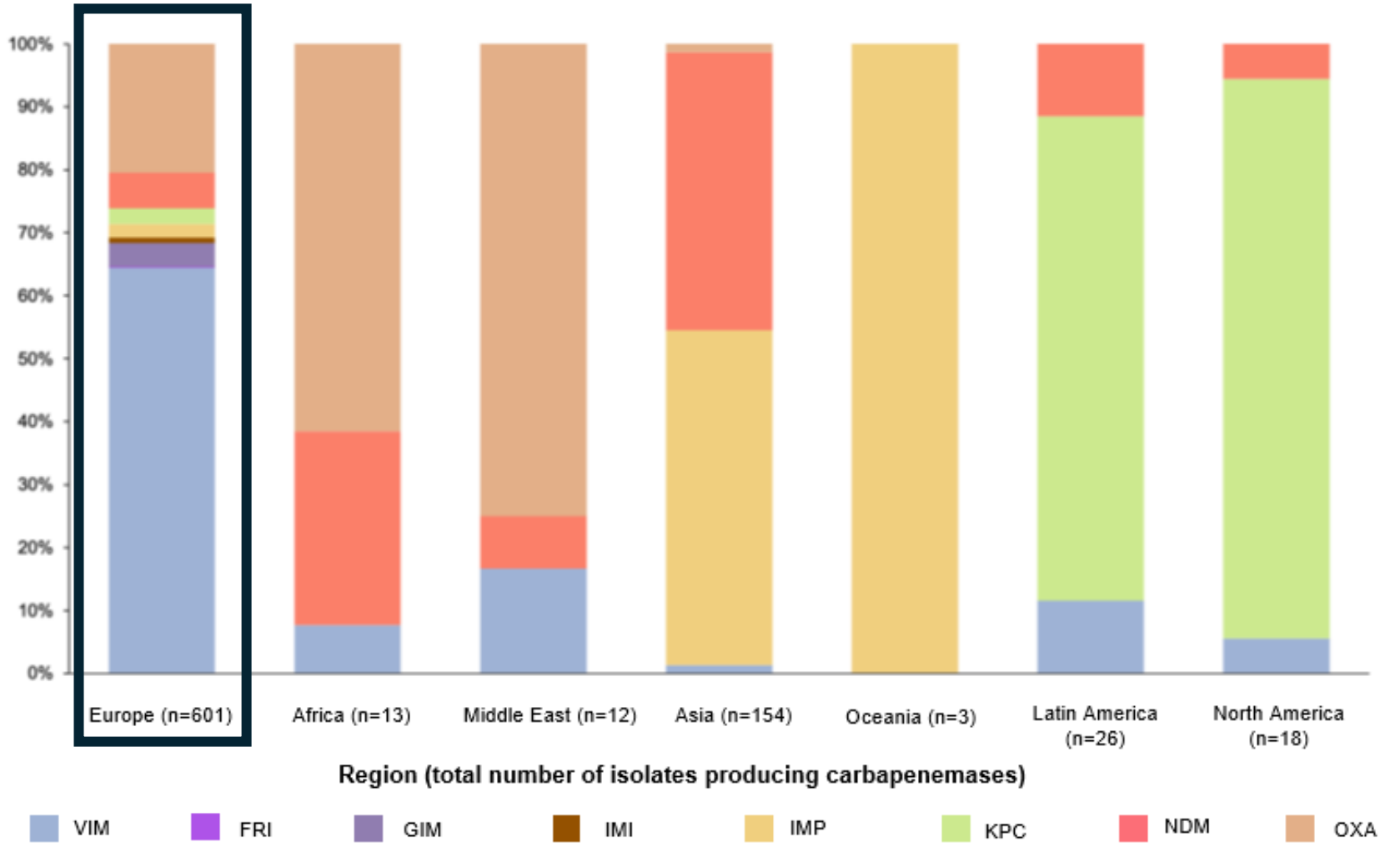
Europe – VIM

Africa – OXA

Asia – NDM; IMP

Oceania – IMP

America – KPC



Original figure

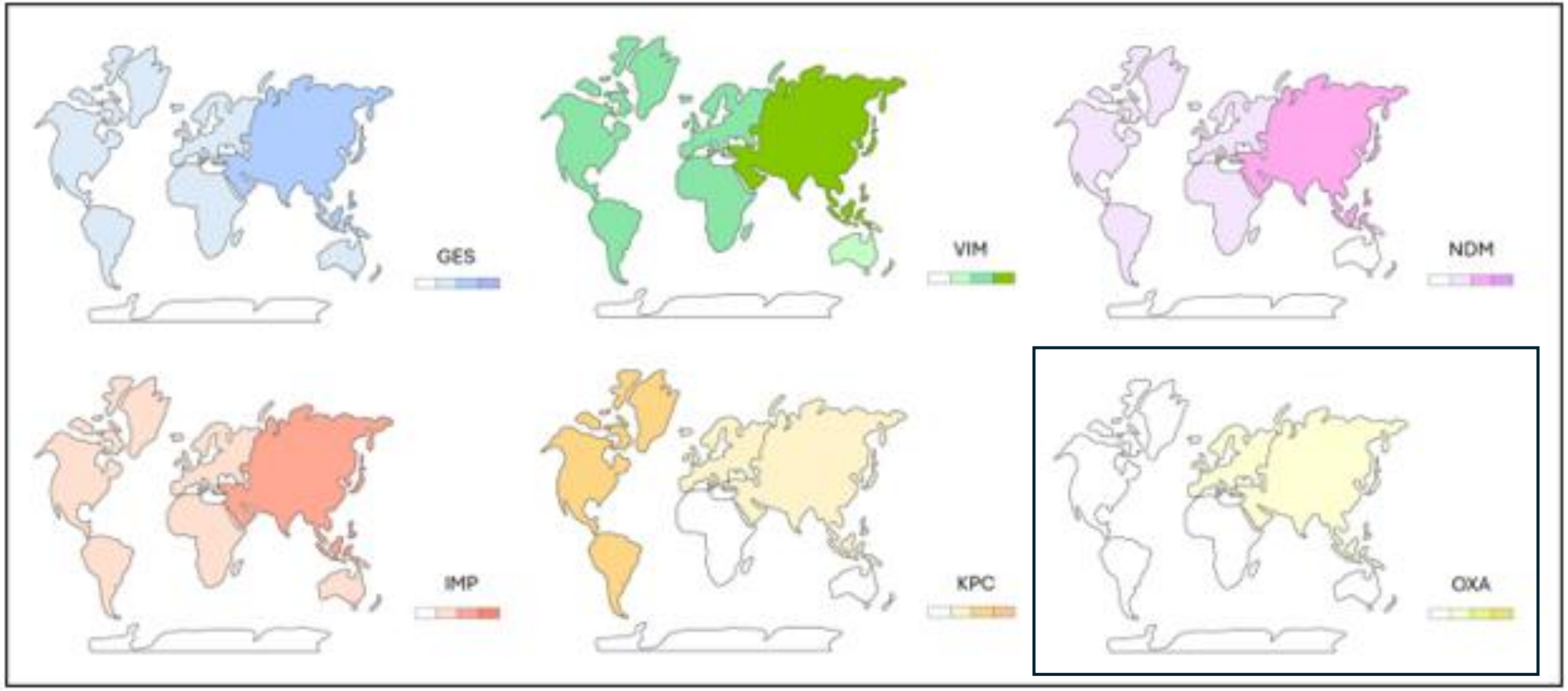


Figure 2. Worldwide distribution of *P. aeruginosa* carbapenemases. Colored areas correspond to the regions where the carbapenemase group has been identified. Color intensity increases with predominance. Original image created with GNU Image Manipulation Program (GIMP 2.10.22).

Pseudomonas aeruginosa

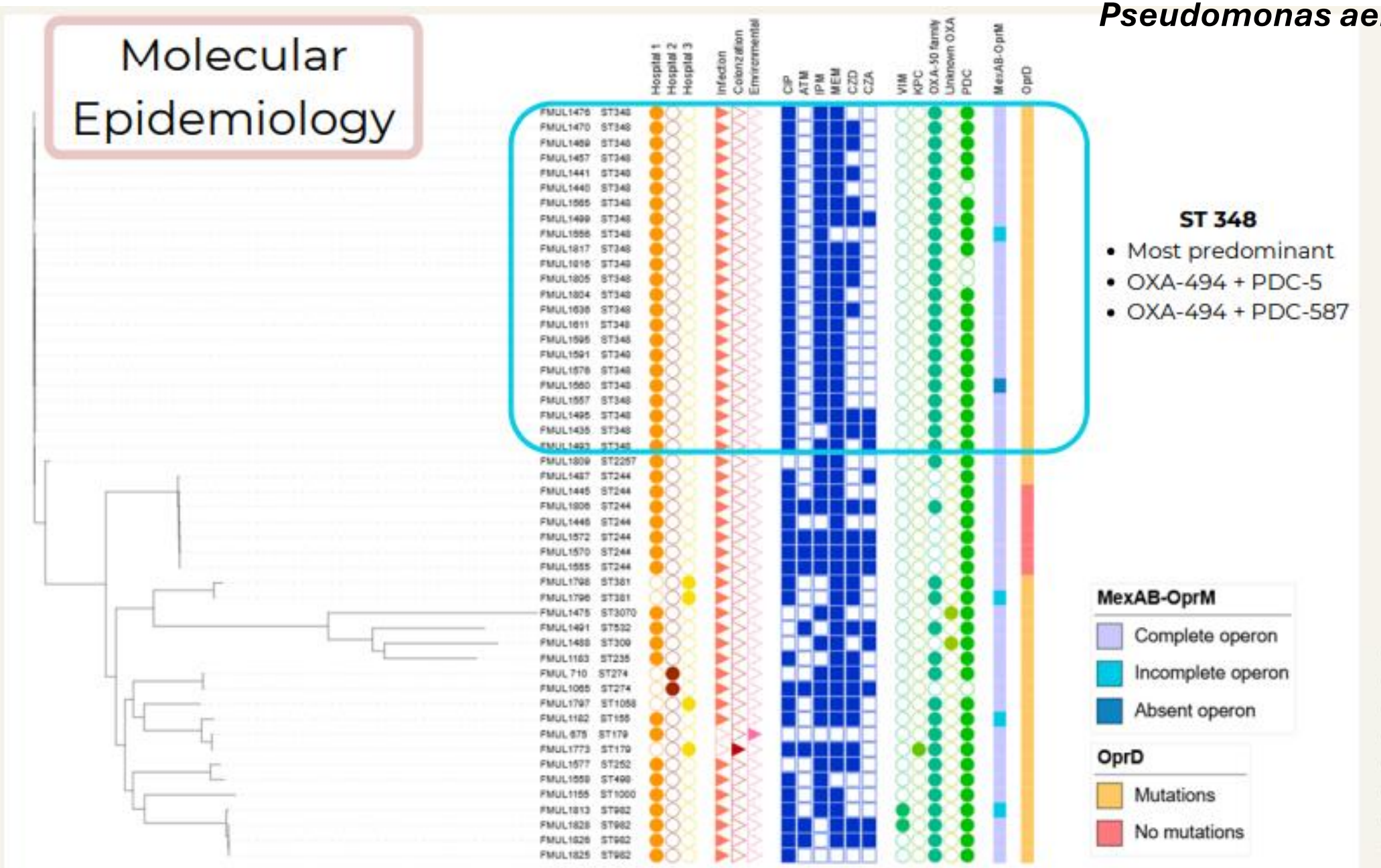


Figure 3. Molecular characteristics and phylogenetic tree for *P. aeruginosa strains* (n=50). The tree was annotated with phenotypic drug susceptibility to ciprofloxacin (CIP), aztreonam (ATM), imipenem (IPM), meropenem (MEM), ceftazidime (CZD) and ceftazidime-avibactam (CZA), where blue squares indicate phenotypic resistance (R).

Novas opções terapêuticas

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E GENÉTICA HUMANA

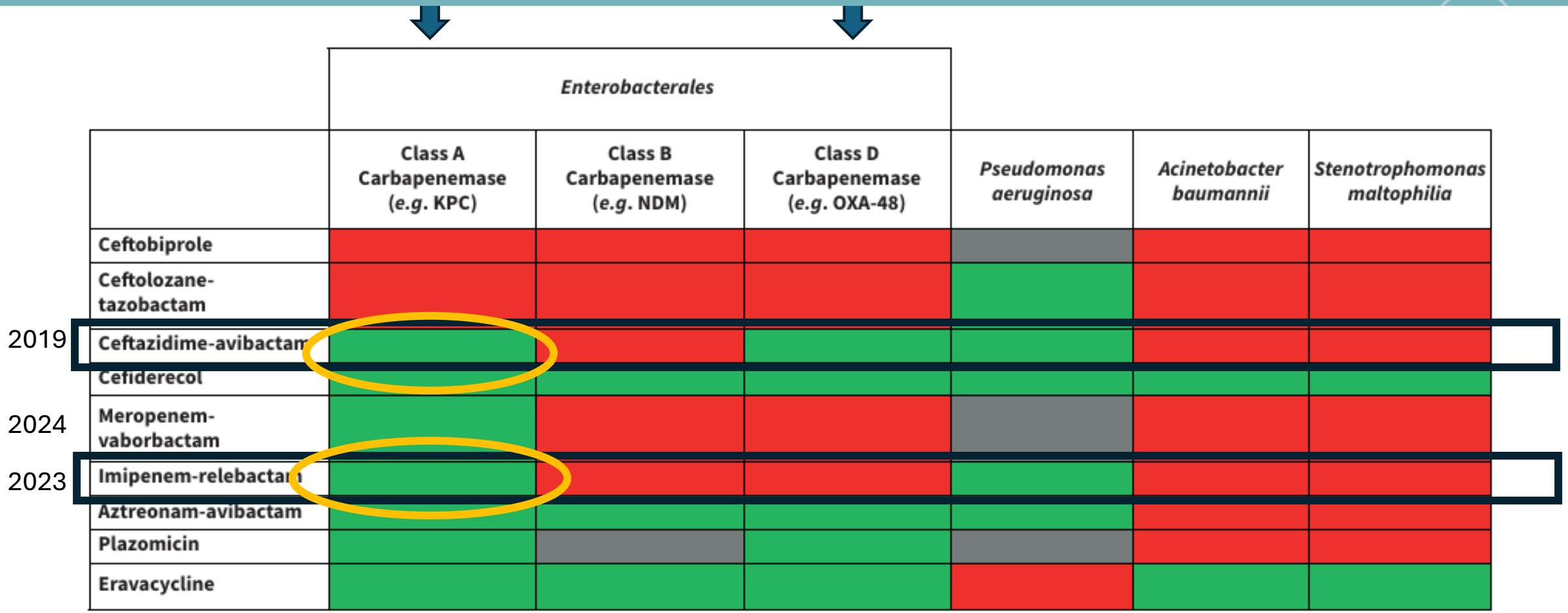
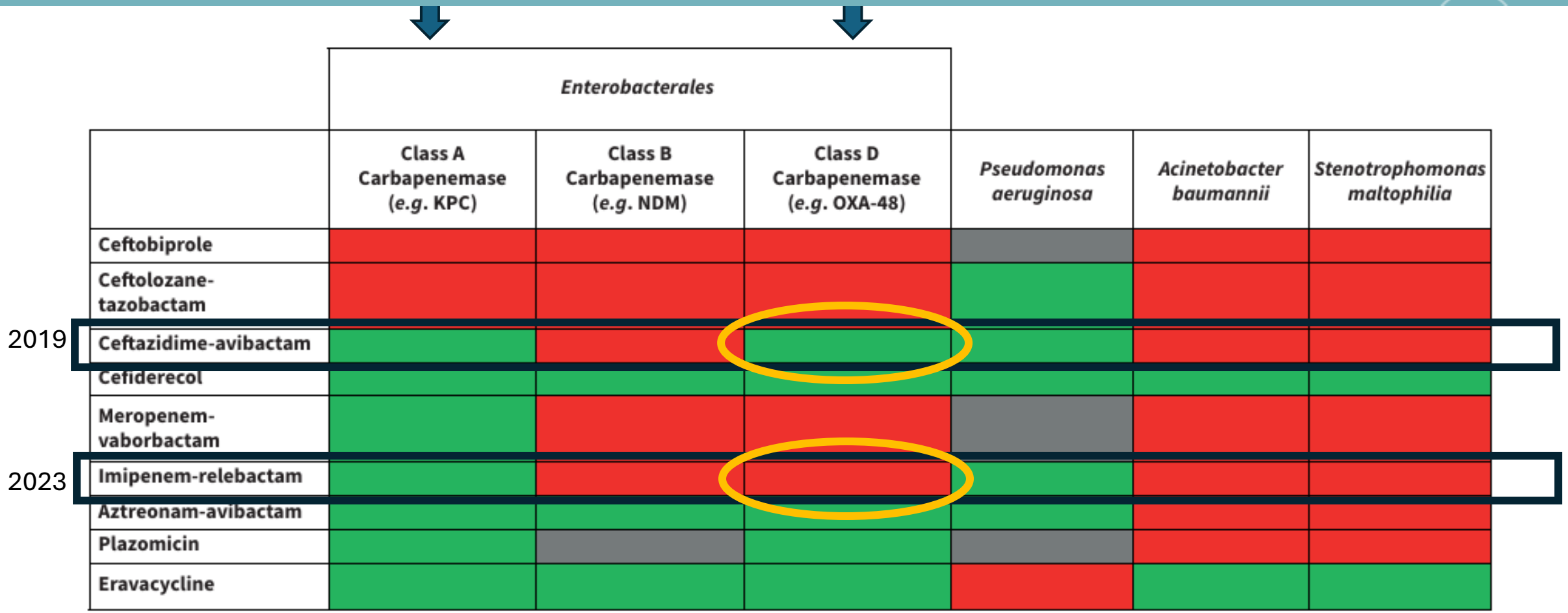


FIGURE 1 Activity of new agents against Gram-negative pathogens. Grey shading: variable activity; red shading: non-activity; green shading: activity. KPC: *Klebsiella pneumoniae* carbapenemases; OXA: OXA-β-lactamases; NDM: New Delhi metallo-β-lactamase.

Matteo Bassetti, Federica Magnè, Daniele Roberto Giacobbe, Lorenzo Bini, Antonio Vena
European Respiratory Review Dec 2022, 31 (166) 220119; **DOI:** 10.1183/16000617.0119-2022



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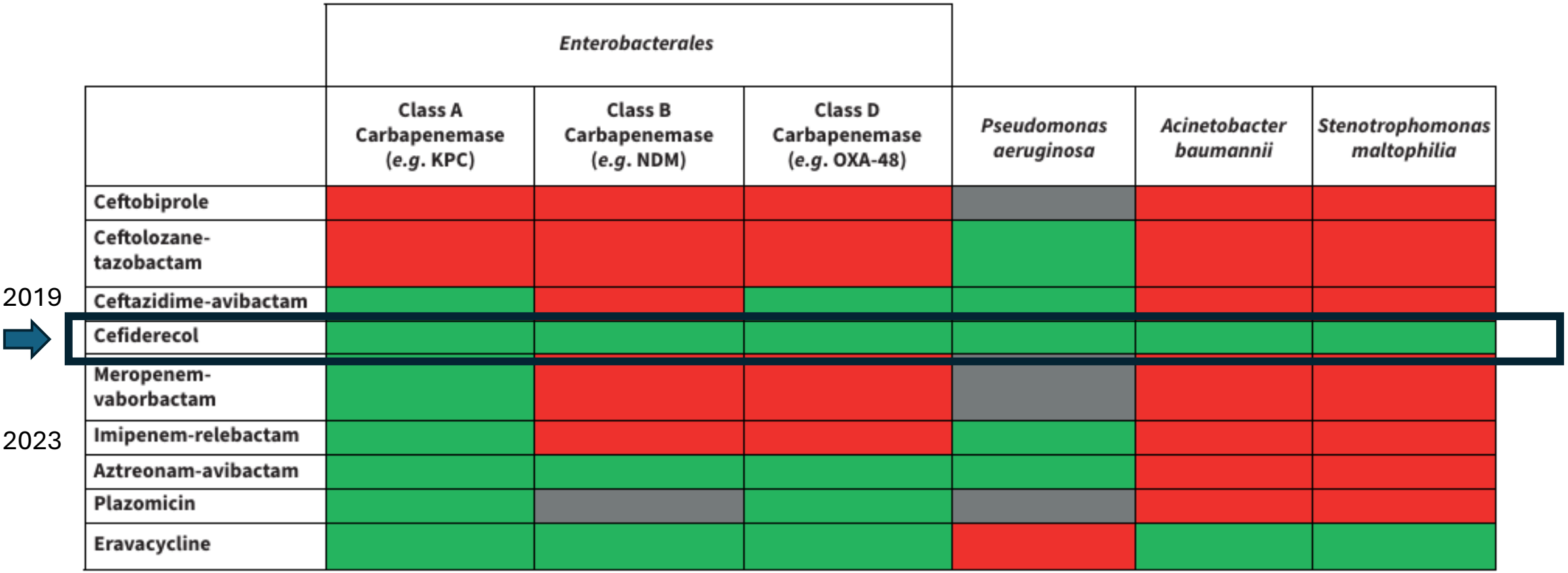

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	Enterobacterales					
	Class A Carbapenemase (*e.g.* KPC)	Class B Carbapenemase (*e.g.* NDM)	Class D Carbapenemase (*e.g.* OXA-48)	*Pseudomonas aeruginosa*	*Acinetobacter baumannii*	*Stenotrophomonas maltophilia*
Ceftobiprole						
Ceftolozane-tazobactam						
2019 Ceftazidime-avibactam						
Cefiderecol						
Meropenem-vaborbactam						
2023 Imipenem-relebactam						
Aztreonam-avibactam						
Plazomicin						
Eravacycline						

FIGURE 1 Activity of new agents against Gram-negative pathogens. Grey shading: variable activity; red shading: non-activity; green shading: activity. KPC: *Klebsiella pneumoniae* carbapenemases; OXA: OXA-β-lactamases; NDM: New Delhi metallo-β-lactamase.

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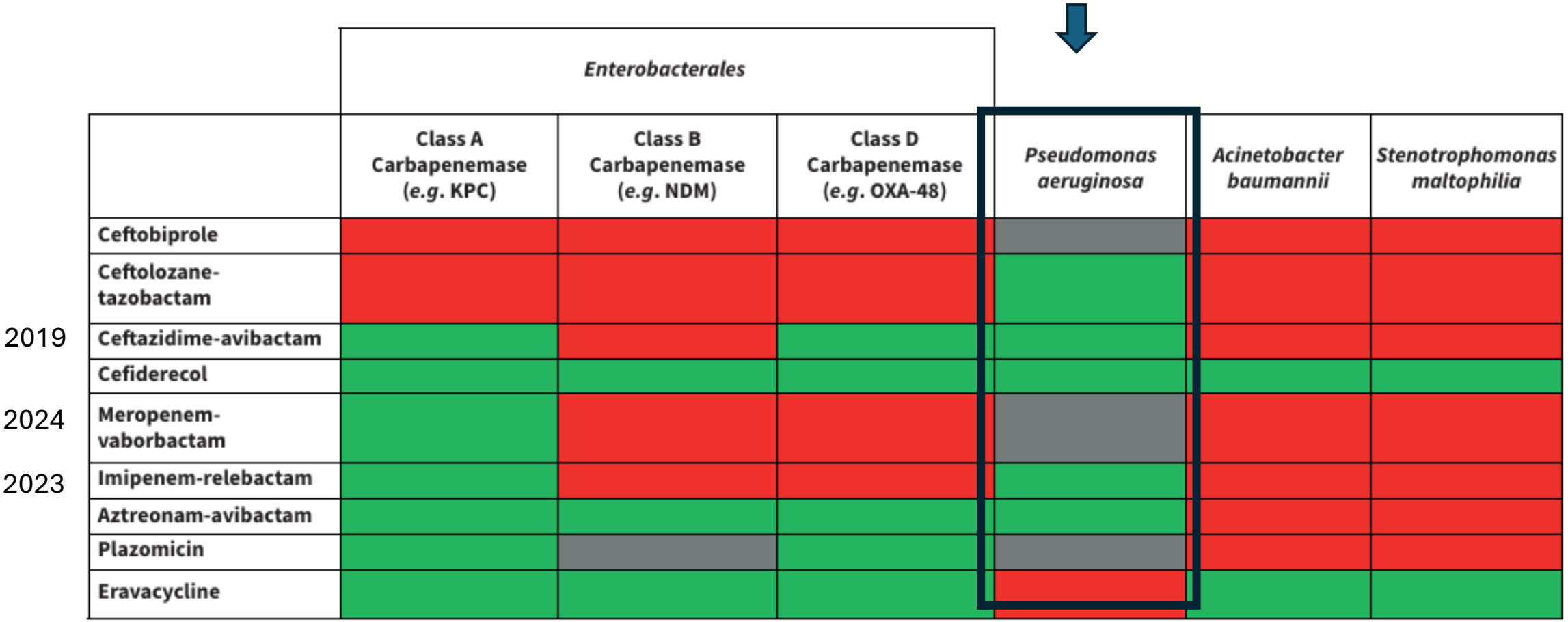
European Respiratory Review Dec 2022, 31 (166) 220119; **DOI:** 10.1183/16000617.0119-2022



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Mecanismo de resistencia	Frec.	CFT/ TAZ	CAZ/ AVI	Cefide rocol	IMI/ REL	MER/ VAB
Betalactamasas clase A. BLEEs	Baja					
Betalactamasas clase A. KPC	Baja					
Betalactamasas clase B. Metalobetalactamasas	Baja					
Betalactamasas clase C	Muy alta					
Betalactamasas clase D. OXA-48	Baja					
Mutación OprD	Alta					
Bombas de eflujo	Alta					

Activity of new antibiotics against the different resistance mechanisms of PA.

Díaz Santos E, Mora Jiménez C, del Río-Carbajo L, Vidal-Cortés P. Tratamiento de las infecciones graves por *Pseudomonas aeruginosa* multirresistente. Med Intensiva. 2022;46:508–520.

Rastreio de EPC

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Avaliação de risco e rastreio de *Enterobacterales* produtores de carbapenemases (EPC) e de *Staphylococcus aureus* resistente a meticilina (SAMR) à Admissão Hospitalar e durante o Internamento

PUBLICAÇÃO: 29 de maio de 2023

1. Na admissão hospitalar, na ausência de teste de *Enterobacterales* produtores de carbapenemases (EPC) positivo nos últimos 12 meses, deve ser efetuado rastreio de EPC e de *Staphylococcus aureus* resistente a meticilina (SAMR) no doente que apresenta, pelo menos, uma das seguintes condições (Anexo II, Quadro 1):
   a) Internamento hospitalar nos 12 meses anteriores (Categoria B) [1–4];
   b) Internamento em unidades de cuidados continuados ou de cuidados paliativos ou residência em estruturas residenciais para idosos (ERPI) (Categoria B) [5];
   c) Hemodiálise crónica (Categoria B) [3];
   d) Admissão a cuidados de nível II e III (Categoria C) [1,6];
   e) Admissão a unidade de hemato-oncologia ou transplantação (Categoria C) [7,8].

5. Durante o internamento hospitalar, na presença de teste de rastreio de SAMR realizado na admissão negativo, deve ser realizado teste de rastreio de EPC e SAMR no doente que apresenta, pelo menos, um dos seguintes critérios (Anexo II, Figura 2):
   a) Transferência para cuidados de nível II e de nível III (Categoria C) [1,6];
   b) Transferência para Unidade de hemato-oncologia ou transplantação (Categoria C) [7,8];
   c) Alta para unidade de internamento de cuidados continuados e de cuidados paliativos ou para ERPI e internamento superior a 10 dias (Categoria C) [5,13].

6. d) A cada dez dias de internamento, até à alta ou até um teste EPC positivo (Categoria B) [14–16].

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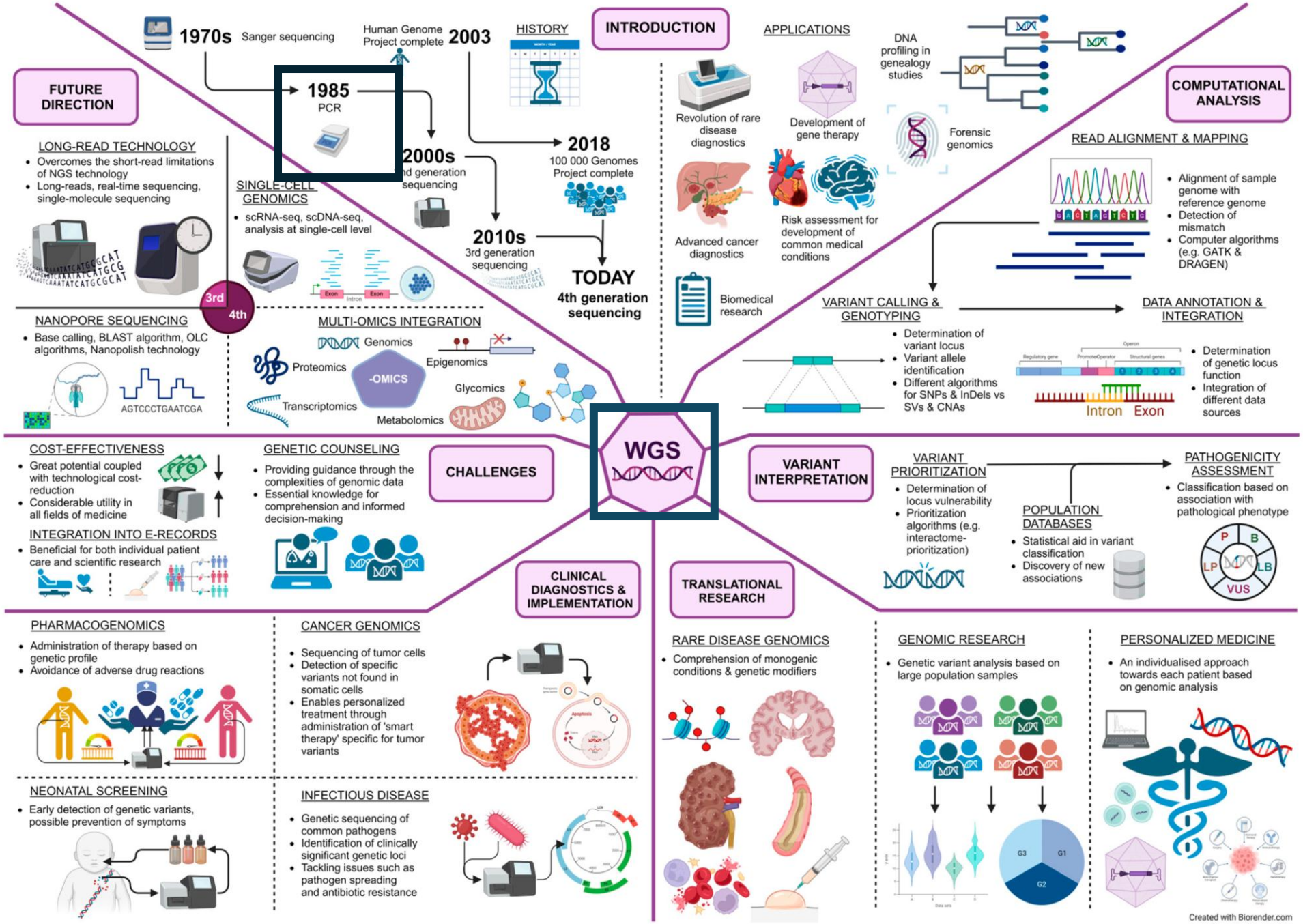
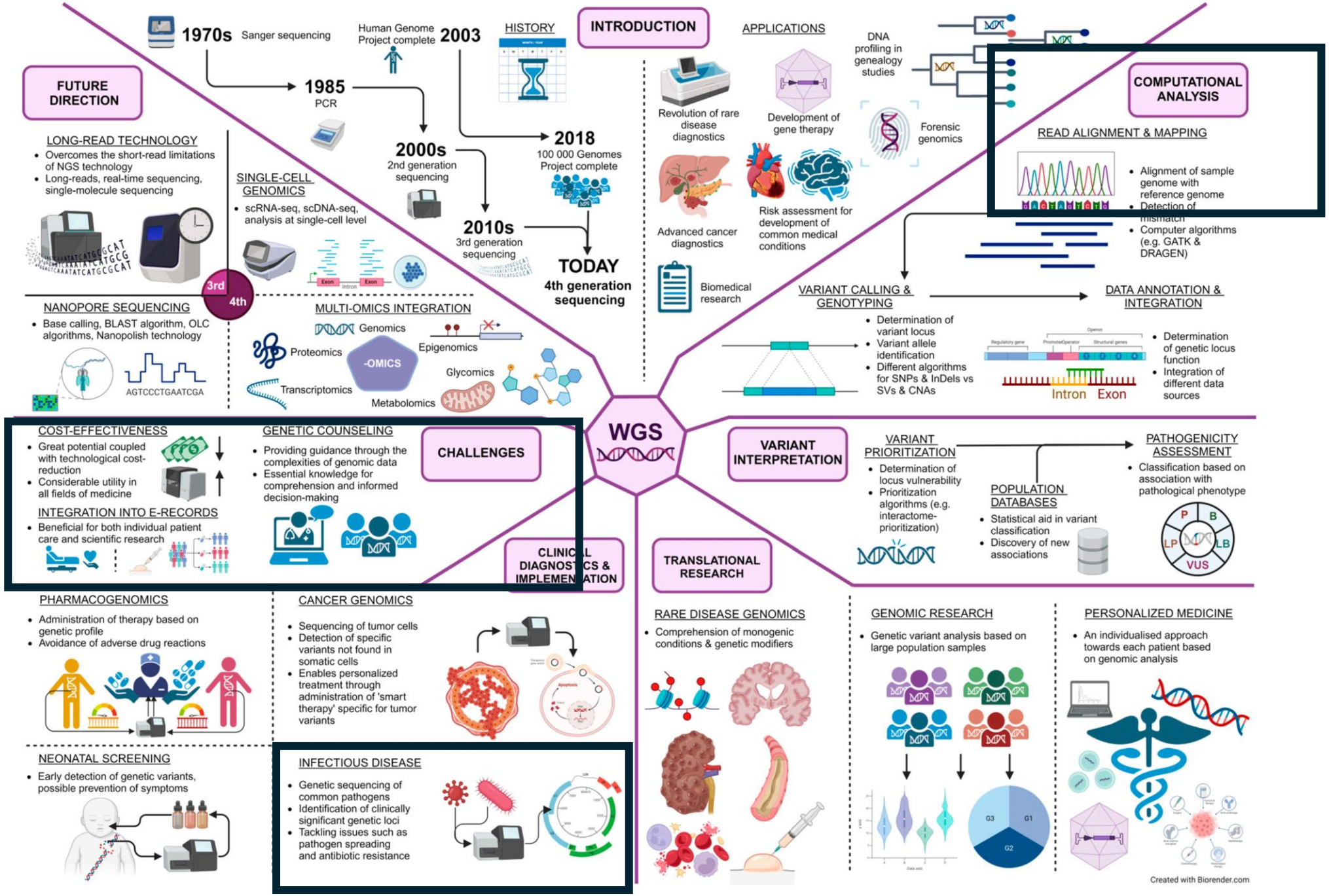


Brlek, P. et al. *Cells* **2024**, *13*, 504



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OBRIGADO

Cátia Caneiras

ccaneiras@gmail.com

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