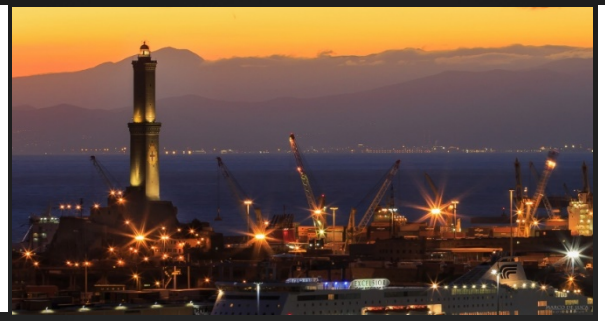
La battaglia quotidiana contro le ICA

Prof. Matteo Bassetti

University of Genoa and Infectious Diseases Clinic, AOM Genoa



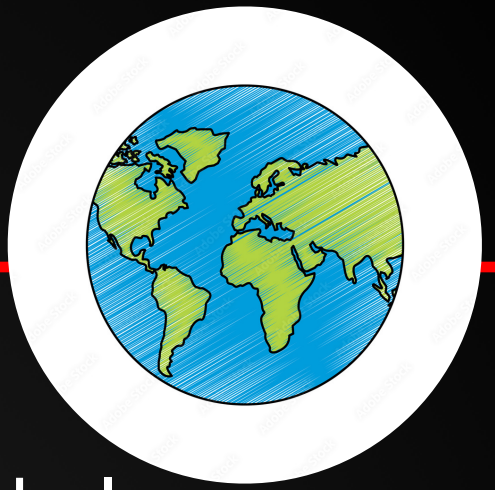
Infezioni correlate all'assistenza (ICA)

Definizione OMS: infezioni che si verificano durante il processo di cura in ospedale o in altre strutture sanitarie, non presenti né in incubazione al momento del ricovero

Perchè sono rilevanti?

1. morbilità e mortalità
2. occupazione dei posti letto
3. durata della degenza ospedaliera
4. carico economico per le strutture sanitarie

Epidemiologia ICA



- Variazione significativa del loro peso a livello globale
- Prevalenza stimata più elevate nei paesi a basso e medio reddito [15.5% vs 4.5% USA (2002) vs 7.1% ECDC (2008)]

Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis

Benedetta Allegranzi, Sepideh Bagheri Nejad, Christophe Combescure, Wilco Graafmans, Homa Attar, Liam Donaldson, Didier Pittet

- 4,3 milioni/anno di pazienti negli ospedali dell'UE/SEE sono colpiti da ICA
- Almeno il 20% delle ICA è considerata prevenibile attraverso programmi di **prevenzione e controllo delle infezioni (IPC)** sostenuti e multifattoriali

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2024 VS 2023

- 9% CR-BSI
- 10% CA-UTI
- 2% delle VAP
- 4% SSI nella chirurgia del colon
- 7% BSI da MRSA a insorgenza ospedaliera
- 11% infezioni da C. difficile a insorgenza ospedaliera

- 8% delle SSI nelle isterectomie addominali

Fattori di rischio

FATTORI DELL'OSPITE

PRATICHE ASSISTENZIALI E TERAPEUTICHE

ICA

PROCEDURE E DISPOSITIVI INVASIVI

FATTORI AMBIENTALI

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Fattori dell'ospite

- **Età avanzata**: >60 anni
- Sesso **maschile**
- **Comorbidità**: diabete mellito, BPCO, malnutrizione, neoplasie
- **Patologie neurologiche**: demenza, ictus, coma
- **Immunosoppressione**: cause iatrogene e non (HIV/AIDS, neutropenia)

Procedure e dispositive invasivi

- **Cateteri venosi centrali**: rischio proporzionale ai giorni d'esposizione
- **Ventilazione meccanica**
- **Catetere urinario**
- **Interventi chirurgici**: tempo operatorio prolungato, reintervento, ferita contaminate/sporca

Pratiche assistenziali e terapeutiche

- **Ricovero in ICU**: durata di degenza
- **Degenza prolungata**: > 15 giorni
- **Terapia antibiotica**
- Emotrasfusioni, emodialisi, NPT

Fattori ambientali

- **Superfici contaminate**: ad alto contatto fungono da serbatoi
- **Persistenza ambientale**: alcuni patogeni sopravvivono per mesi (C. difficile, Acinetobacter, norovirus)
- **Formazione di biofilm**: superfici e dispositivi
- **Attrezzature contaminate**
- **Trasmissione crociata:** tramite le mani del personale contaminate da contatto diretto con pazienti/superfici

Sindromi cliniche

Table 4. Percentages of All Surveyed Patients with Specific Types of Health Care–Associated Infection, 2011 vs. 2015 Survey.*

Type of Infection	2011 Survey			2015 Survey			P Value†
	No. of Patients with Infection	No. of Infections	Percentage of Patients with Infection (95% CI)	No. of Patients with Infection	No. of Infections	Percentage of Patients with Infection (95% CI)	
Pneumonia	110	110	0.98 (0.81–1.20)	110	110	0.89 (0.74–1.10)	0.52
Ventilator-associated pneumonia	43	43	0.38 (0.28–0.51)	39	39	0.32 (0.23–0.43)	0.41
Other pneumonia	67	67	0.59 (0.47–0.75)	71	71	0.58 (0.46–0.73)	0.87
Gastrointestinal infection	86	86	0.76 (0.62–0.94)	91	91	0.74 (0.60–0.91)	0.84
Clostridium difficile infection‡	61	61	0.54 (0.42–0.69)	66	66	0.54 (0.42–0.68)	0.97
Other gastrointestinal infection	25	25	0.22 (0.15–0.33)	25	25	0.20 (0.14–0.30)	0.76
Surgical-site infection	109	110	0.97 (0.80–1.20)	69	69	0.56 (0.44–0.71)	<0.001
Deep incisional or organ-space infection	77	77	0.68 (0.55–0.85)	54	54	0.44 (0.34–0.57)	0.01
Superficial incisional infection	33	33	0.29 (0.21–0.41)	15	15	0.12 (0.07–0.20)	0.004
Bloodstream infection	50	50	0.44 (0.34–0.58)	51	52	0.41 (0.31–0.55)	0.74
Central catheter–associated bloodstream infection	42	42	0.37 (0.27–0.50)	37	38	0.30 (0.22–0.42)	0.35
Other primary bloodstream infection	8	8	0.07 (0.03–0.14)	14	14	0.11 (0.07–0.19)	0.29
Urinary tract infection	65	65	0.58 (0.45–0.73)	39	39	0.32 (0.23–0.43)	0.003
Catheter-associated urinary tract infection	44	44	0.39 (0.29–0.52)	24	24	0.20 (0.13–0.29)	0.005
Other urinary tract infection	21	21	0.19 (0.12–0.29)	15	15	0.12 (0.07–0.20)	0.21
Other infection§	78	83	0.69 (0.55–0.86)	61	66	0.50 (0.39–0.64)	0.05
Any infection	452	504	4.0 (3.7–4.4)	394	427	3.2 (2.9–3.5)	<0.001

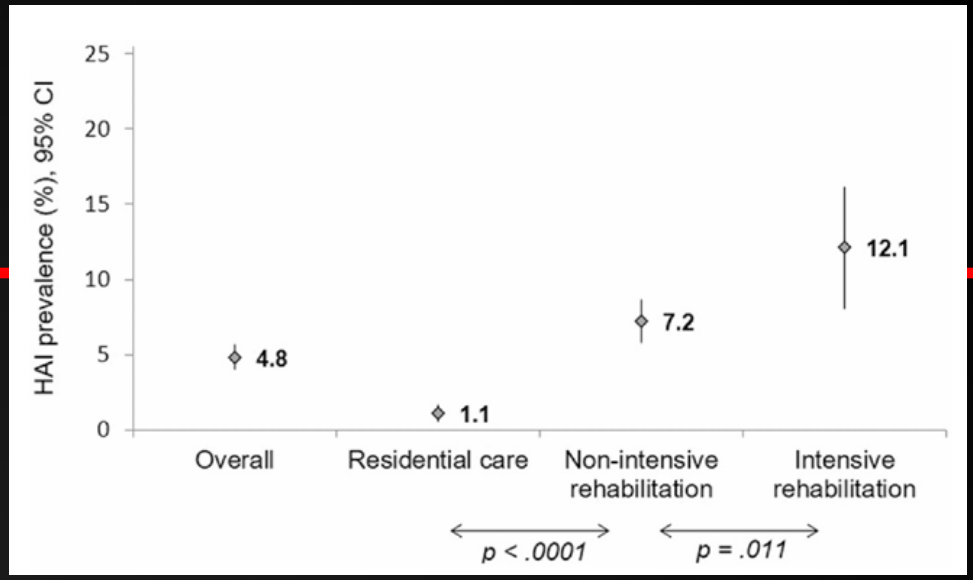
* A total of 11,282 patients were included in the 2011 survey, and 12,299 in the 2015 survey; these values are the denominators for the percentages of patients with infection. Patients could have more than one health care–associated infection.

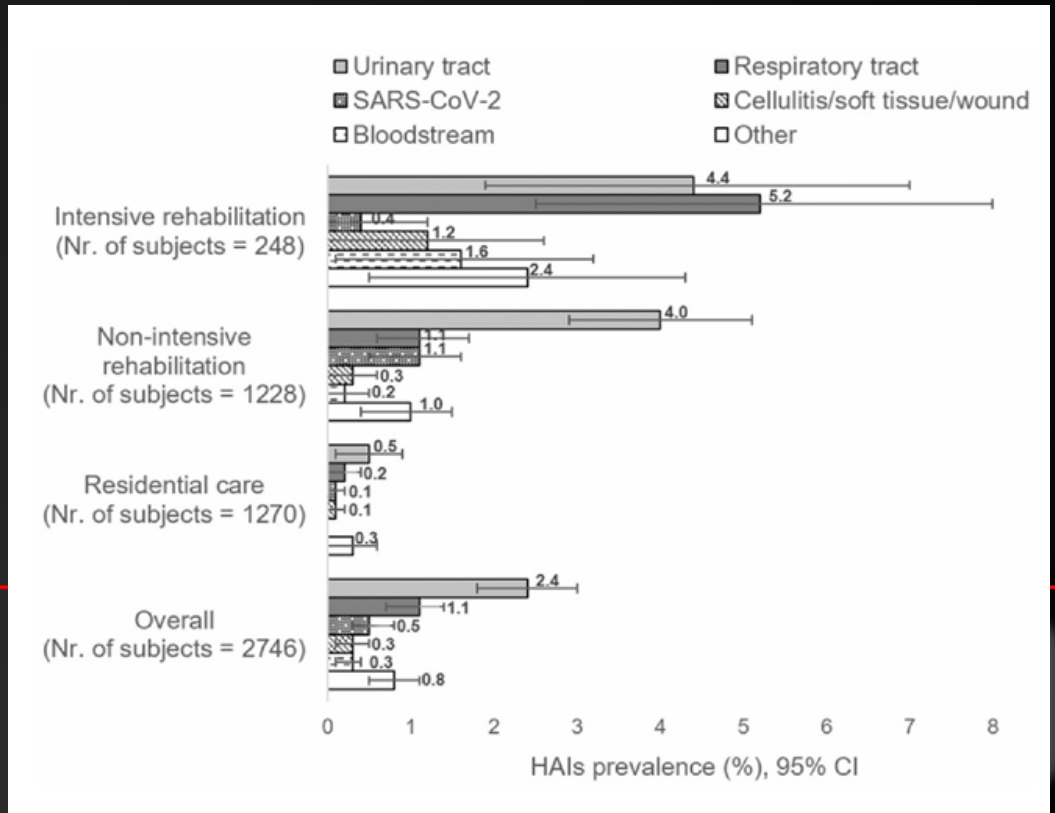
Magill SS, et al. *N Engl J Med*. 2018;379(18):1732-1744. doi:10.1056/NEJMoa1801550

Sindromi cliniche - Italia

Table 2
Frequencies of identified healthcare-associated infections according to care setting.

	Total (N = 147)
Identified healthcare-associated infection, n (%)	
Urinary tract (confirmed)	38 (25.9)
Urinary tract (probable)	28 (19.0)
Pneumonia	15 (10.2)
Other lower respiratory tract	14 (9.5)
SARS-CoV-2 (mild/moderate)	11 (7.5)
Cellulitis/soft tissue/wound	8 (5.4)
Bloodstream	7 (4.8)
Clostridioides difficile	5 (3.4)
SARS-CoV-2 (asymptomatic)	4 (2.7)
Gastroenteritis	4 (2.7)
Unexplained fever/conjunctivitis/herpes simplex or zoster	5 (3.4)
Other	8 (5.4)





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Brambilla L, Azat al Infect Public Health. 2025 Jul;18(7)

Patogeni responsabili di ICA

BATTERI

FUNGHI

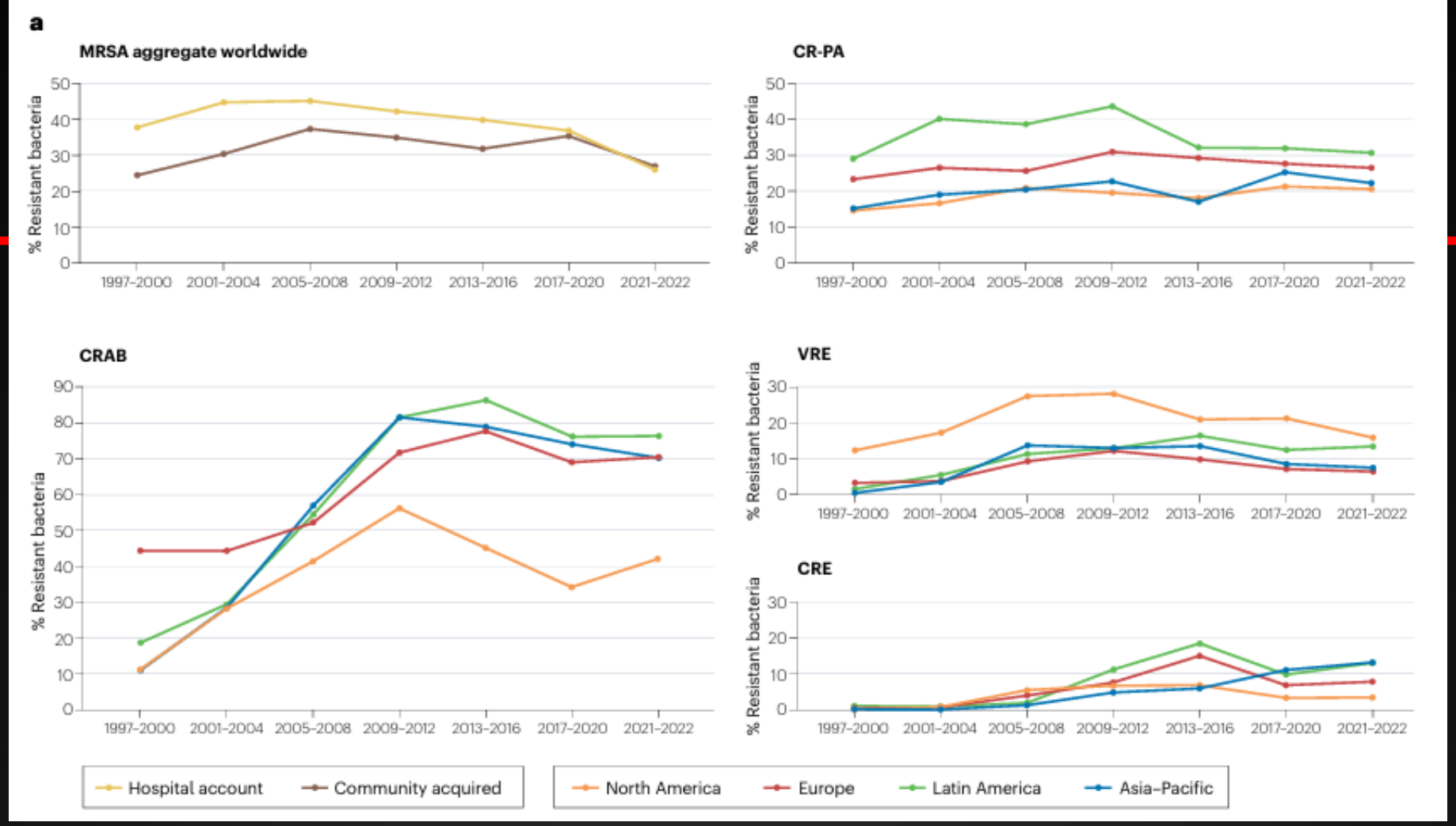
VIRUS

Batteri

- Enterococcus spp
- Staphylococcus aureus
- Klebsiella spp
- Acinetobacter baumannii
- Pseudomonas aeruginosa
- Enterobacterales
- Clostridioides difficile

Table 1 | Overview of ESKAPE pathogens

Organism	Major clinical syndromes
Vancomycin-resistant *Enterococcus faecium*	Bloodstream infection, infective endocarditis, intra-abdominal infection, UTI
Methicillin-resistant *Staphylococcus aureus*	Bloodstream infection, infective endocarditis, ABSSSI, CAP, HAP/VAP, bone and joint infection
Carbapenem-resistant or ESBL-producing *Klebsiella pneumoniae*	Bloodstream infection, UTI, CAP, HAP/VAP, intra-abdominal infection
Carbapenem-resistant *Acinetobacter baumannii*	HAP/VAP, bloodstream infection, UTI
Carbapenem-resistant *Pseudomonas aeruginosa*	HAP/VAP, bloodstream infection, UTI
Carbapenem-resistant or ESBL-producing *Enterobacter cloacae* complex	Bloodstream infection, UTI, HAP/VAP, intra-abdominal infection



Incidenza globale degli organismi ESKAPE tra il 1997 e il 2022

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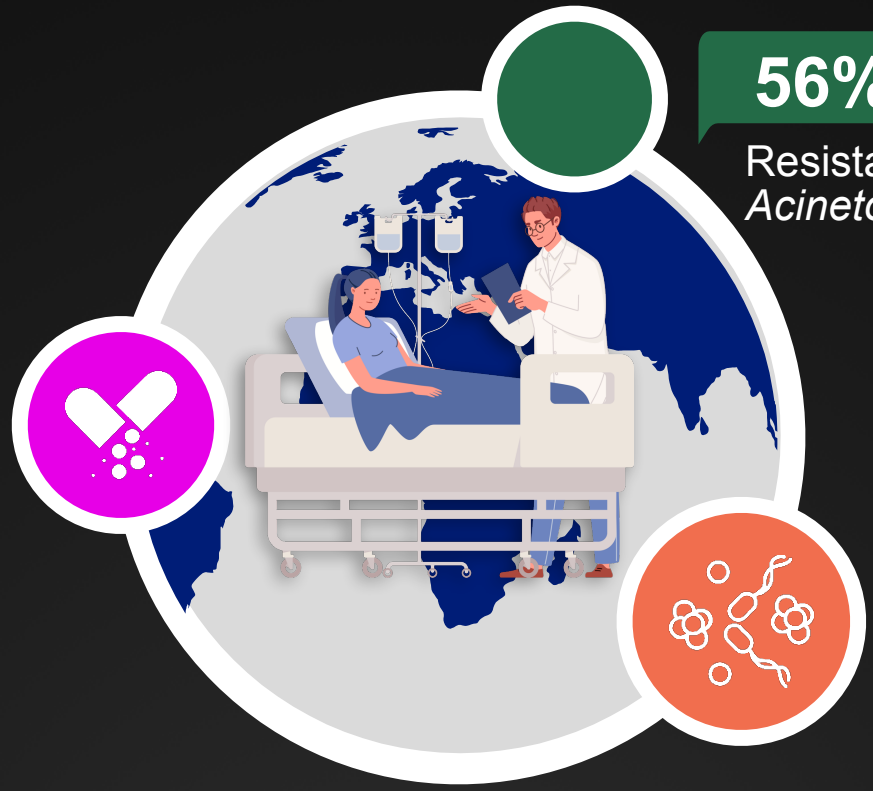
AMR: A GLOBAL ISSUE…[1]



56%+*

Resistance in key pathogens: *Acinetobacter spp.* and *Klebsiella spp.*[2]

46%

Global increase in consumption of prescribed antibiotics between 2000 and 2018[1]

4.95 million

Deaths globally in 2019 associated with bacterial AMR[3]

*Data from the 2022 GLASS report covering 87 countries, territories and areas shows a global resistance rate of ≥56% in *Acinetobacter* spp. to carbapenem and aminoglycosides, and ≥57% in *Klebsiella pneumoniae* to third- and fourth-generation cephalosporins. This data accounts for varying testing coverage across different regions.

AMR, antimicrobial resistance

1. Browne AJ, *et al. Lancet Planet Health* 2021;5:e893-e904; 2. Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report: 2022. World Health Organization. Available at: https://www.who.int/publications/i/item/9789240062702. Accessed Sep 2025; 3. Antimicrobial Resistance Collaborators. *Lancet* 2022;399:629–655.

Combatting AMR

"Superbugs Perfect Storm"

- MRSA
- Vancomycin-resistant Enterococcus
- MDR *Acinetobacter baumannii*
- MDR *Pseudomonas aeruginosa*
- ESBL-producing Enterobacterales
- Carbapenem resistant Enterobacterales
- PR/MR *Streptococcus pneumoniae*
- MDR *Myobacterium tuberculosis*
- *MDR gonococci*
- *Candida auris*
- *Aspergillus azole-resistant*

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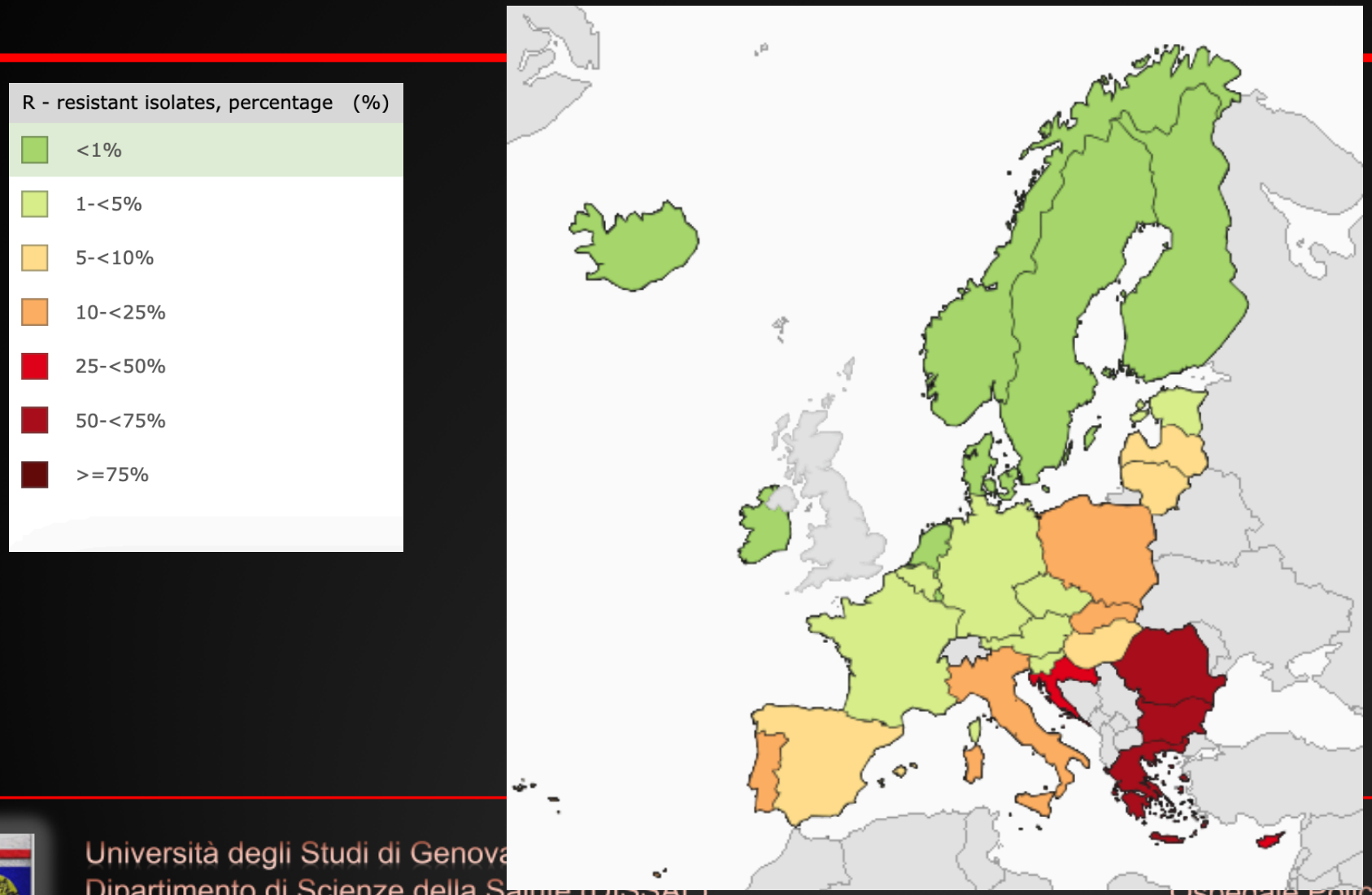
IDSA Public Policy. *Clin Infect Dis.* 2011;52(Suppl 5):S397–S428

Klebsiella pneumoniae resistance to carbapenems



https://atlas.ecdc.europa.eu/public/index.aspx, 2024 data

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Mortality Doubles With Infections Caused by CR - Pathogens

Infections caused by CR and MDR pathogens exacerbate an elevated risk of mortality[1,2]

Klebsiella pneumoniae[1]

Pooled mortality

~21%	vs	~42%
Carbapenem-S		Carbapenem-R
(n=2239)		(n=2462)

A systematic review and meta-analysis of 62 studies, involved 4701 patients, of whom 2462 had infection caused by CRKP.[1]

Pseudomonas aeruginosa[2]

30-day mortality

~25%	vs	~45%
non-MDR		MDR
(n=2388)		(n=813)

A meta-analysis of qualifying studies between 2006 and 2016 evaluated the risk of mortality in patients with infection caused by *P. aeruginosa*.

[a]MDR was defined as resistance to at least 3 different classes of antimicrobials, including carbapenems, antipseudomonal cephalosporins, fluoroquinolones, aminoglycosides, and β-lactams with inhibitors.[2]
CR, carbapenem-resistant; CRKP, carbapenem-resistant *Klebsiella pneumoniae;* CSKP, carbapenem-susceptible *Klebsiella pneumoniae*; KPC, *Klebsiella pneumoniae* carbapenemase; MDR, multidrug-resistant; *P. aeruginosa, Pseudomonas aeruginosa*; VIM, Verona integron-encoded metallo-β-lactamase.

References: 1. Xu L et al. *Ann Clin Microbiol Antimicrob*. 2017;16:18. **2.** Matos ECO et al. *Rev Soc Bras Med Trop*. 2018;51(4):415-420.

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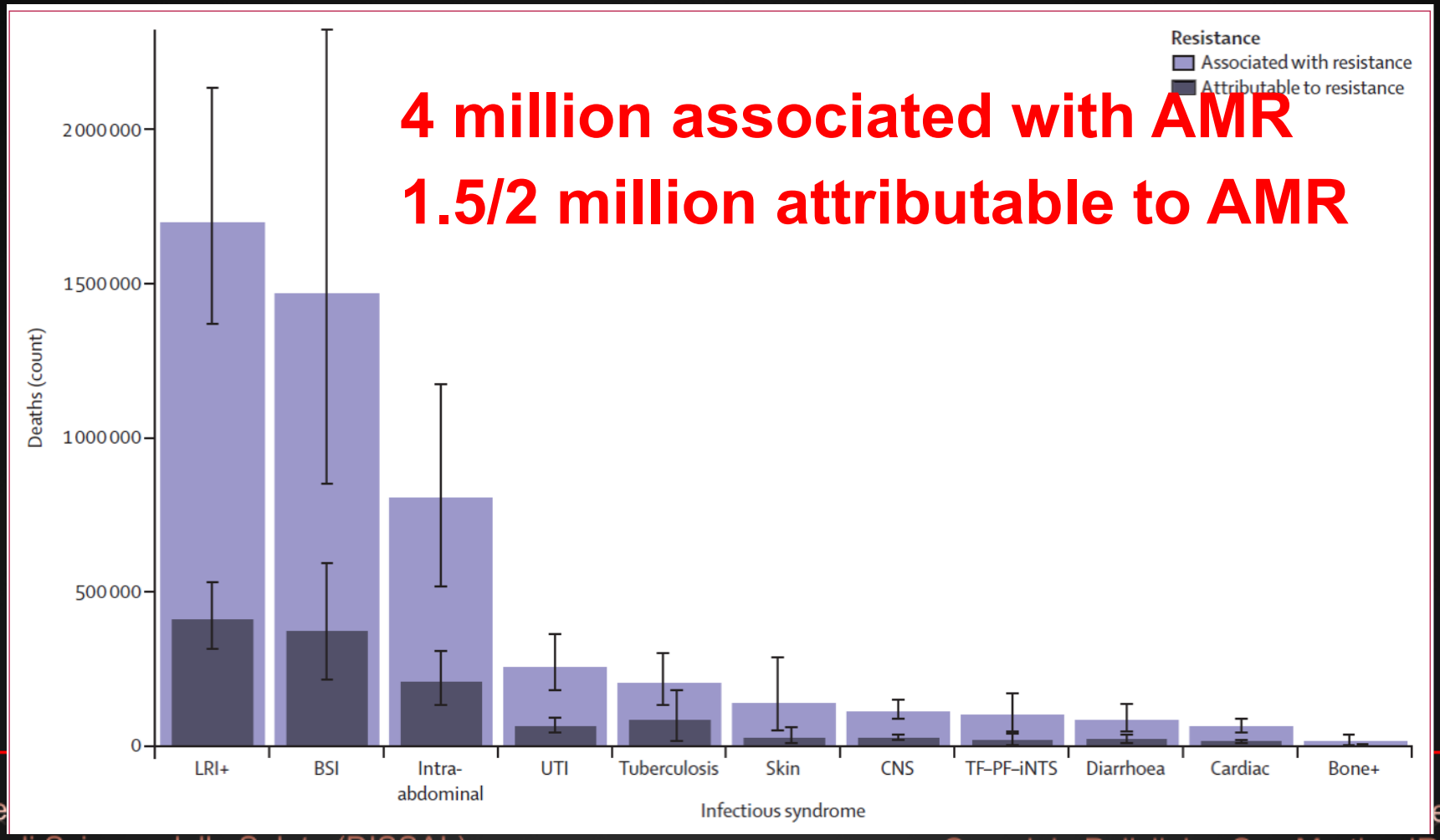
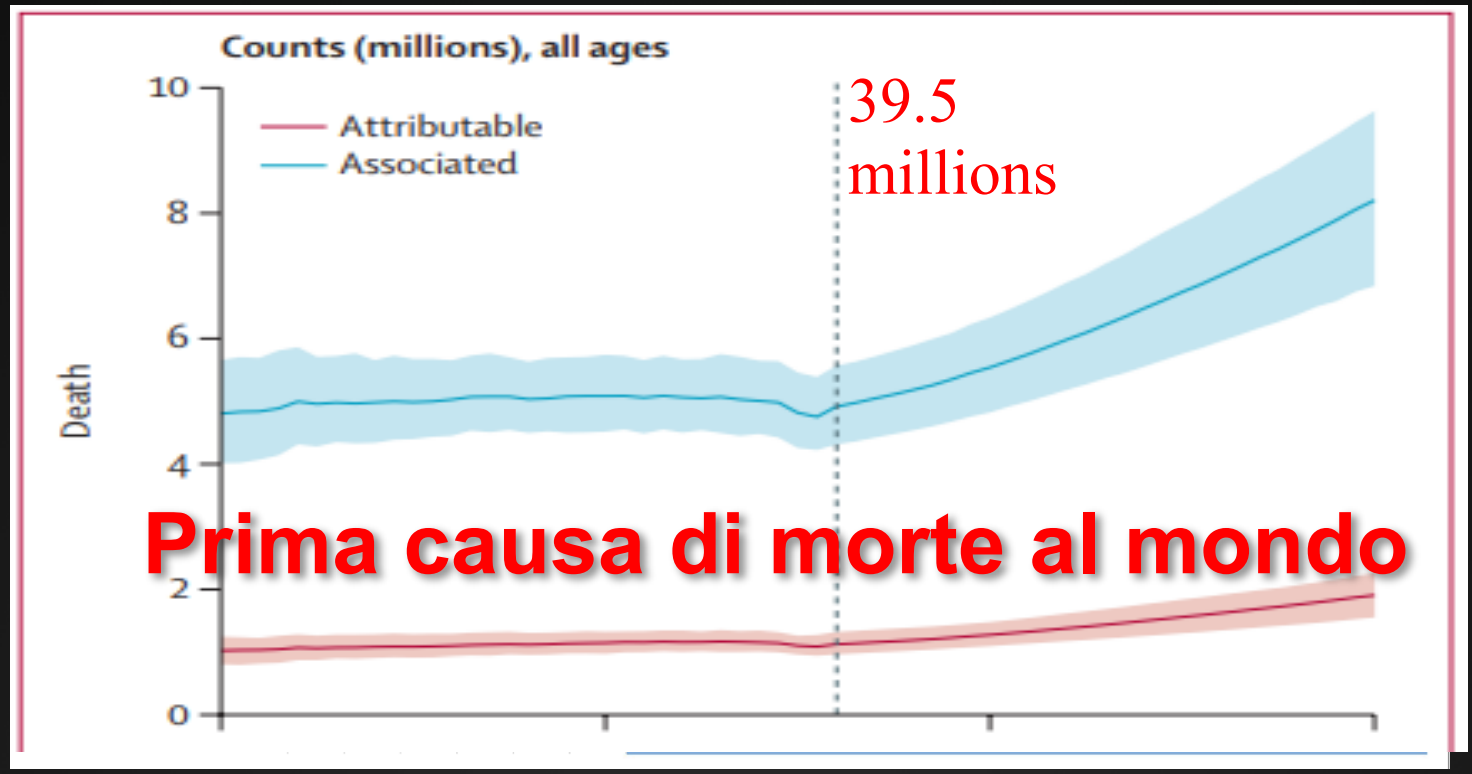
Global deaths (counts) attributable to and associated with bacterial antimicrobial resistance by infectious syndrome, 2019



Antimicrobial Resistance Collaborators. *Lancet* 2022; **399**: 629–55

AMR Without intervention…..by 2050



Bassetti M et al. *Intensive Care Med.* 2017 Jul 21. doi: 10.1007/s00134-017-4878-x

Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050. Lancet; Sept. 2024

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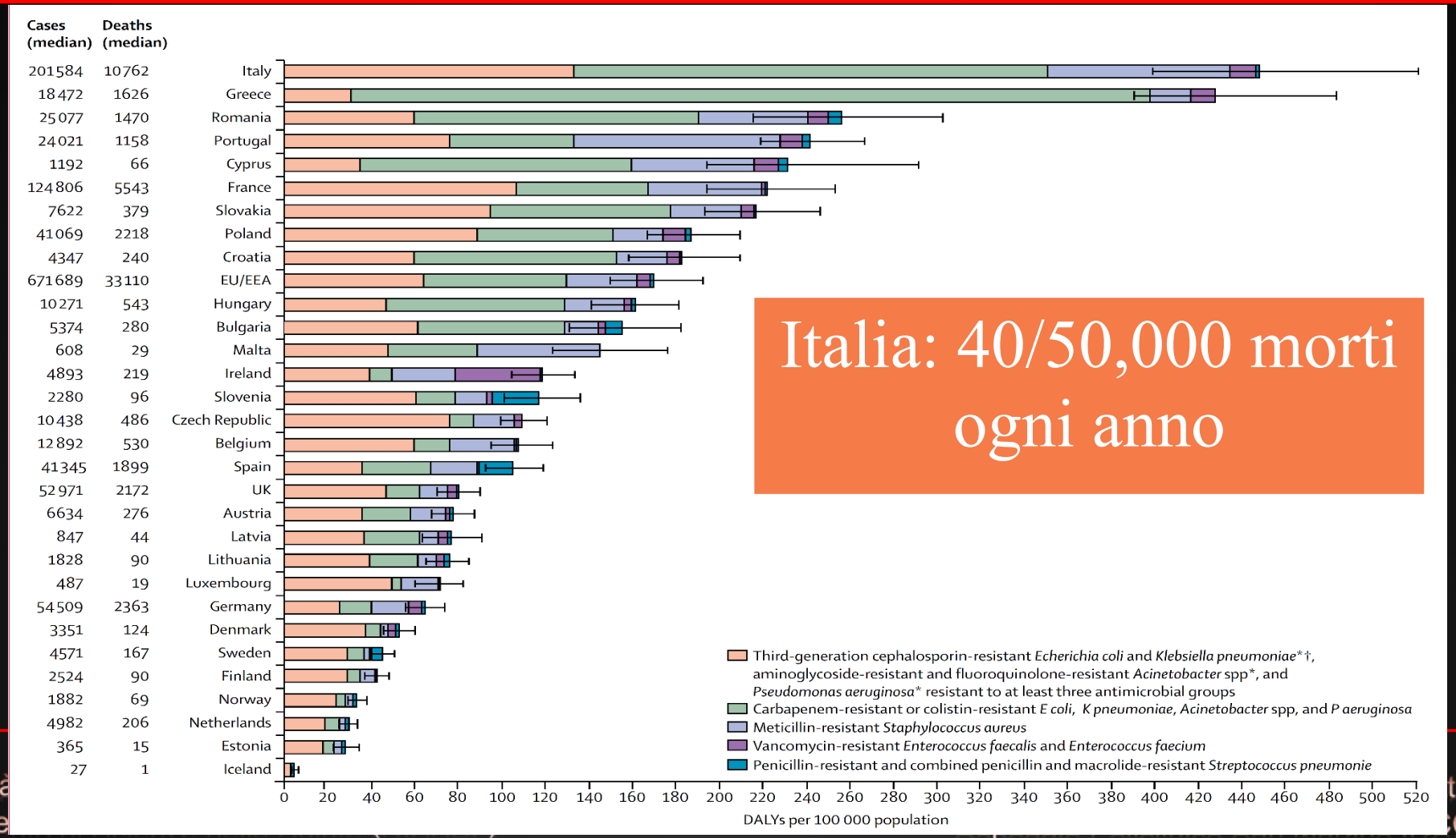
Impact of antibiotic- resistant bacteria in the EU in hospital

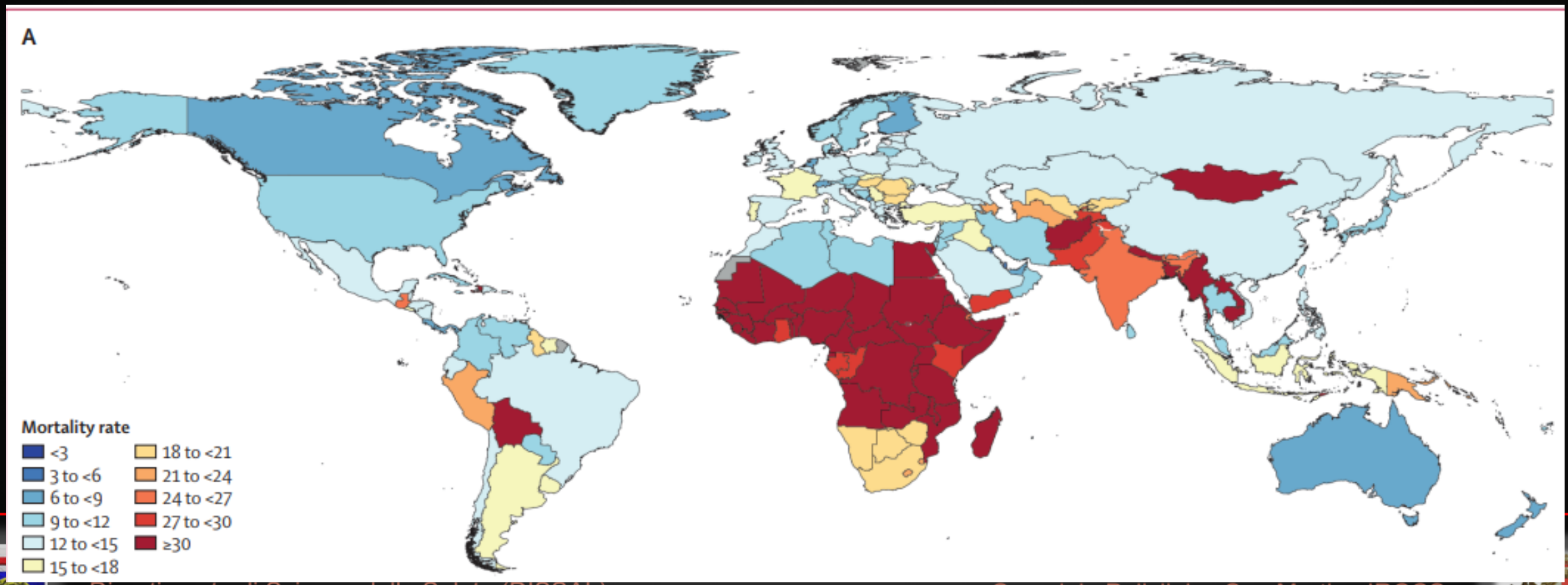


Italia: 40/50,000 morti ogni anno

Cassini A et al. *Lancet Infect Dis.* 2019 Jan;19(1):56-66.

Death rates per 100000 attributable to AMR, all ages, 1990, 2021, 2050

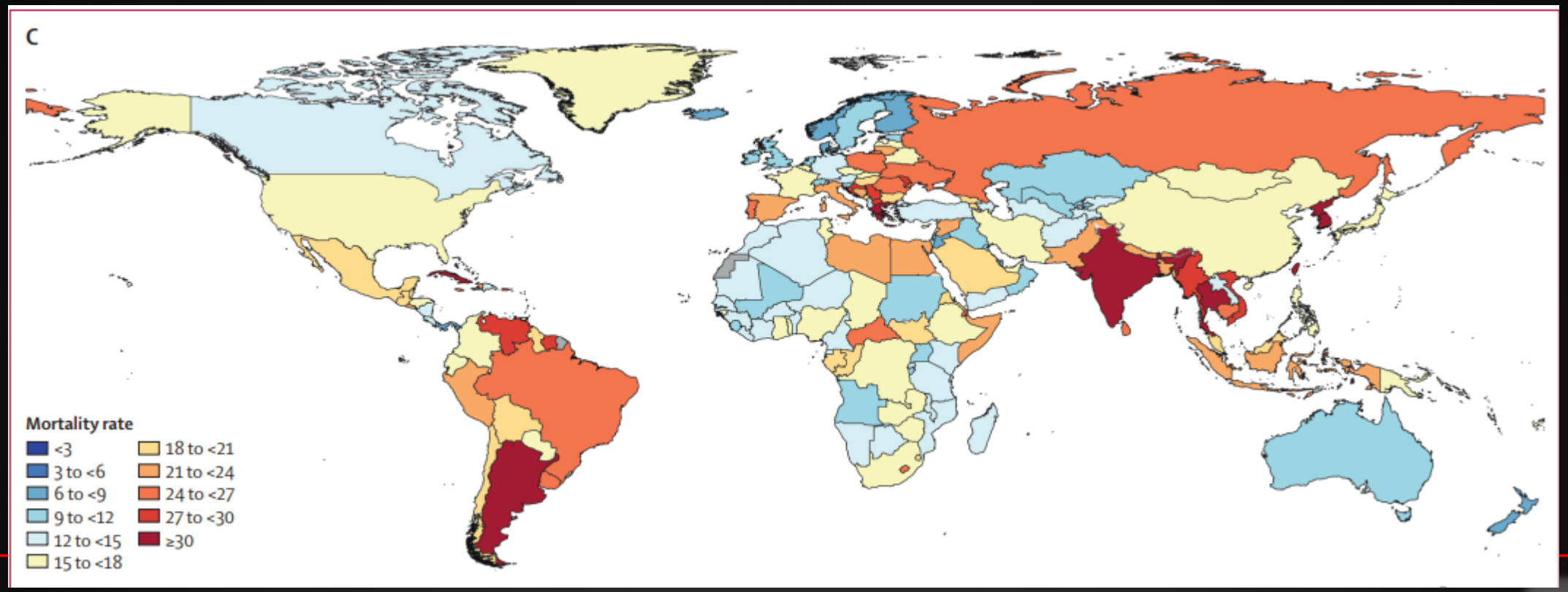
1990



Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050. Lancet, Sept. 20

Death rates per 100000 attributable to AMR, all ages, 1990, 2021, 2050

2050



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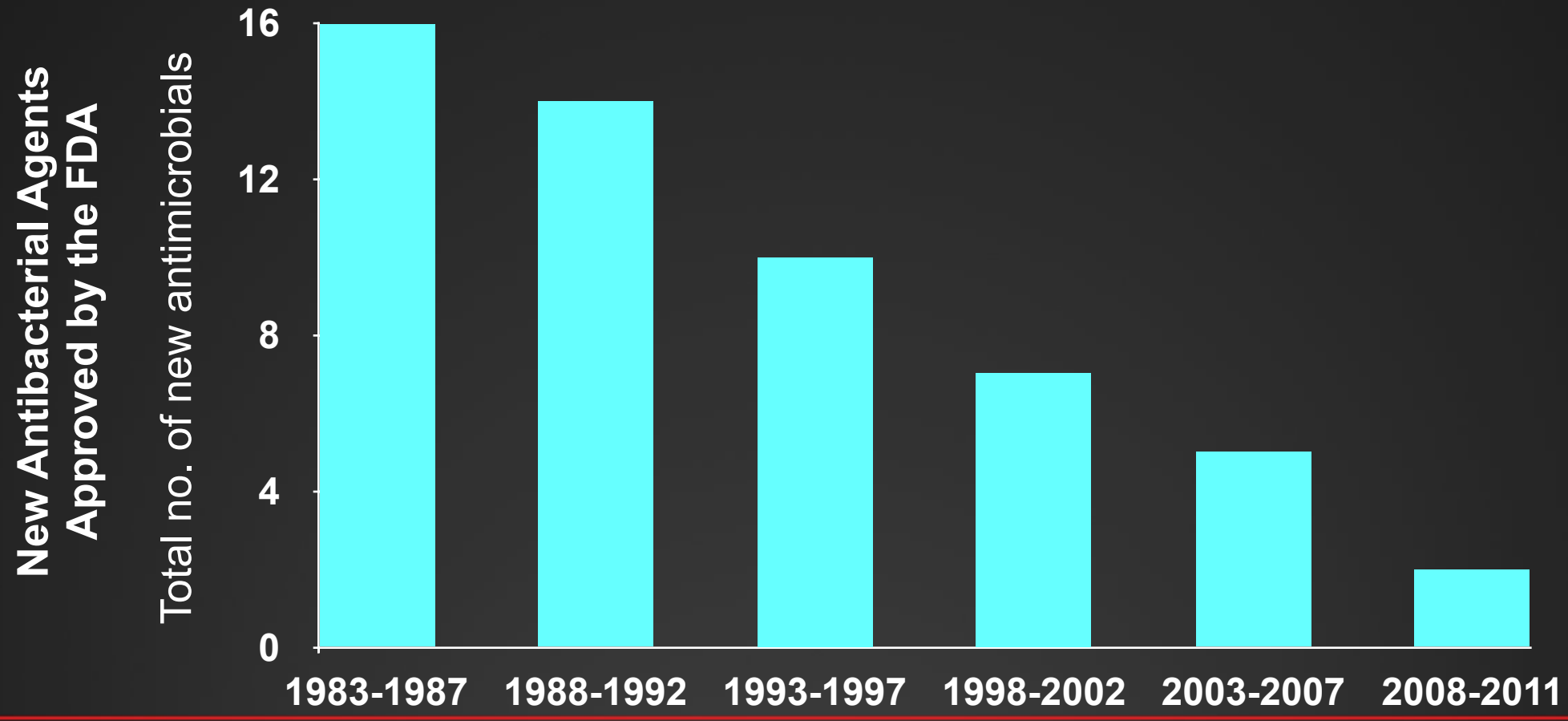
1980-2010. Antibiotic Options Decline…



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IDSA Public Policy. *Clin Infect Dis.* 2011;52(Suppl 5):S397-S428.

Why the decrease?

- Reasons for decreased antibiotic development over the last twenty years:
  - Economic
    - Low price
    - Short-trem treatment
    - Small markets for narrow spectrum antibiotics
  - Regulatory
    - Precedence of bigger studies
    - Shift to indication and non-inferiority
  - Science
    - Espertises lost in R&D and commercial groups

IDSA

Infectious Diseases Society of America

Bad Bugs
Need Drugs

10x'20

Ten new ANTIBIOTICS by 2020

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Approval of new classes has fallen behind

INNOVATION GAP

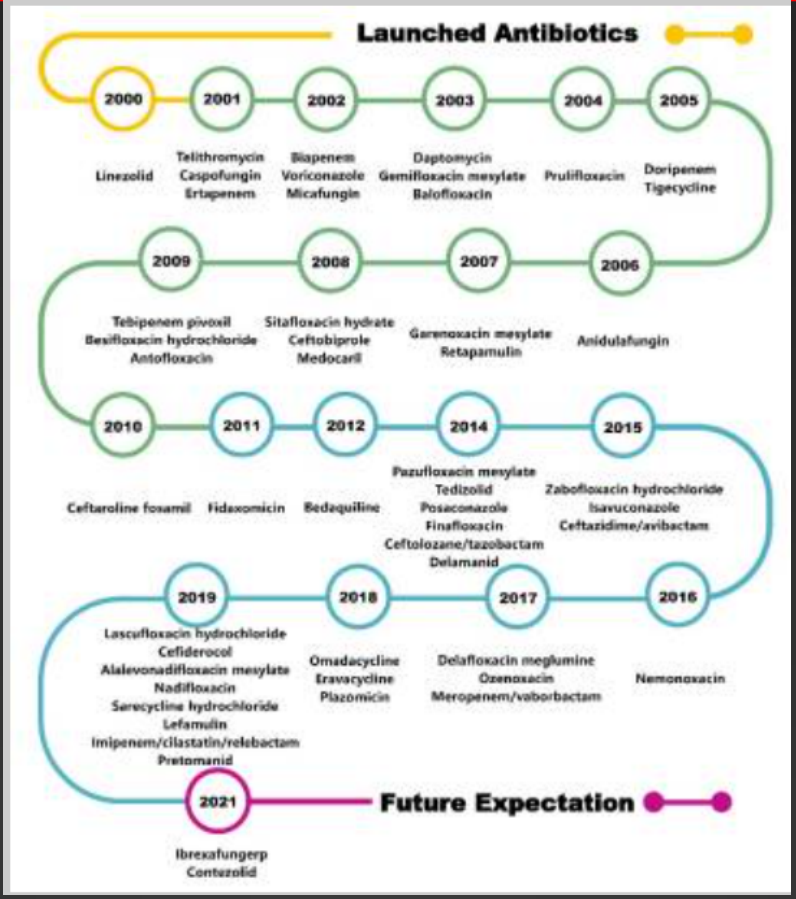
Every FDA-approved antibiotic in use today for the treatment of Gram-negative bacterial infections is based on a scientific discovery made prior to 1962.

* Cefiderocol was approved by FDA in 2019 and EMA in 2020. The FDA-approved label for cefiderocol classifies the drug as a cephalosporin, and therefore not a new class but certainly a new mechanism of action. Some experts consider cefiderocol to be a first-in-class sideromycin. The predecessors to cefiderocol were discovered at Shionogi in the early 1990s. CID 2019;69(7):S538-S543

* This chart excludes bedaquiline, which is the first drug in a new class to treat tuberculosis.

Source: Pew Charitable Trusts; Deak D, Powers JH, Outterson K, Kesselheim AS. Progress in the Fight Against Multidrug Resistant Bacteria?: A Review of FDA Approved Antibiotics 2010-2015. ANNALS OF INTERNAL MED. 2016 MAY 31. DOI: 10.7326/M16-0291.

Antibiotics approved in the past 25 years



Molecules. 2023 Feb 13;28(4):1762. doi: 10.3390/molecules28041762

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The Situation twenty years later/today

- The late-stage clinical development pipeline remains unacceptably lean[2]
  - Some important molecules for problematic pathogens such as MRSA
  - Some novel and highly microbiological active molecules for other ESKAPE pathogens
  - Few new drugs for infection due to MDR Gram-negative bacilli (e.g., *A baumannii* and *P. aeruginosa*)
  - **None (few) represent more than an incremental advance over currently available therapies**
  - **No drugs with new mechanism of action**

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[1]Rice LB. *J Infect Dis*. 2008;197:1079-1081.
[2]Boucher HW, et al. *Clin Infect Dis*. 2009;48:1-12.

Inhibition spectrum of β-lactamases inhibitors

Inhibitor	ESBL	AmpC	KPC	MBL	OXA-48-like	Intrinsic ATB activity
Clavulanic acid	++	-	+	-	-	-
Sulbactam	++	-	+	-	-	PBP2
Tazobactam	++	-	+	-	-	-
Enmetazobactam	**+++**	-/+	**++**	-	-	-
Avibactam	**+++**	**++**	**+++**	-	**+**	-
Relebactam	**+++**	**++**	**+++**	-	**+/-**	-
Vaborbactam	**+++**	**++**	**+++**	-	**+/-**	-
Zidebactam	+++	++	+++	-	?	PBP2
Taniborbactam	+++	++	+++	++ (except IMP)	?	?

Table adapted from Barbier et al. Annals of Intensive Care (2023) 13:65

[redacted]

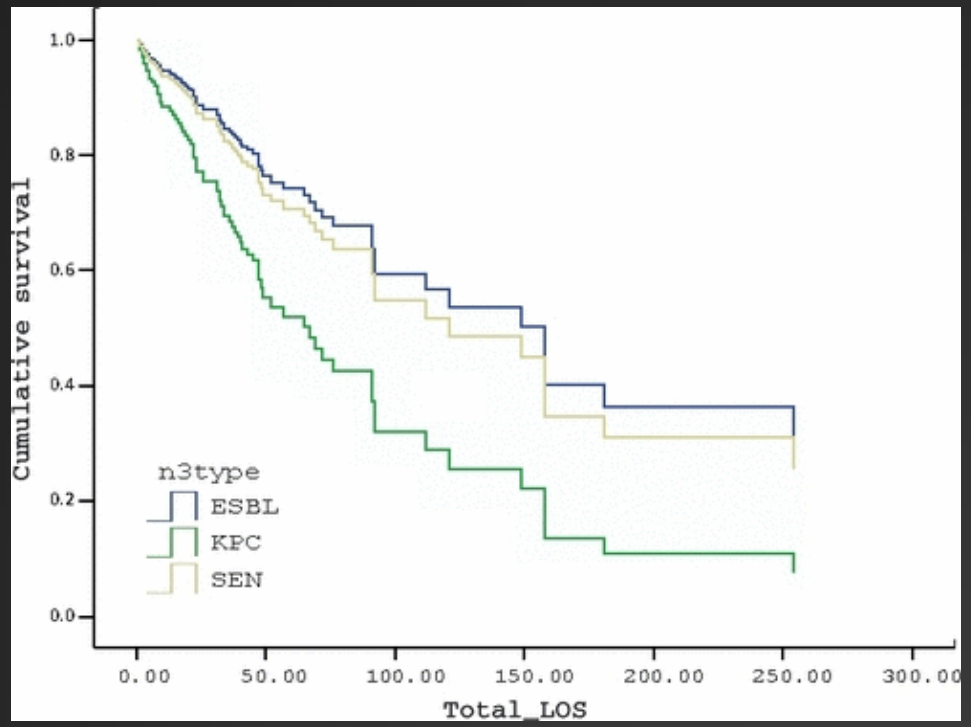
Activity of new agents against Gram-negative pathogens.

	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						
Ceftazidime-avibactam						
Cefiderecol						
Meropenem-vaborbactam						
Imipenem-relebactam						
Aztreonam-avibactam						
Plazomicin						
Eravacycline						

Bassetti M et al. Eur Respir Rev. 2022 Dec 31; 31(166): 220119

Mortality

Comparison in mortality among patients with carbapenem-resistant (n=42), extended-spectrum β-lactamase producers (ESBL- n=68) and susceptible *K. pneumoniae* bloodstream infections (n=120),



- Infection-related mortality was 48% for carbapenem-resistant, 22% for ESBL producers and 17% for susceptible *K. pneumoniae*.

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Ben David B et al, Clin Microbiol Infect. 2011 Feb 1. doi: 10.1111/j.1469-0691.2011.03478.x

J Antimicrob Chemother
https://doi.org/10.1093/jac/dkad262

Journal of Antimicrobial Chemotherapy

Mortality in KPC-producing *Klebsiella pneumoniae* bloodstream infections: a changing landscape

Daniele Roberto Giacobbe[1,2*], Cristina Marelli[2], Greta Cattardico[1,2], Chiara Fanelli[2,3], Alessio Signori[4], Gabriele Di Meco[2], Vincenzo Di Pilato[5], Malgorzata Mikulska[1,2], Maria Mazzitelli[6], Anna Maria Cattelan[6,7], Carlo Pallotto[8], Daniela Francisci[8], Alessandra Calabresi[9], Andrea Lombardi[10,11], Andrea Gori[11,12], Valerio Del Bono[13], Chiara Aldieri[13], Angela Raffaella Losito[14], Francesca Raffaelli[14], Andrea Cortegiani[15,16], Marta Milazzo[15], Filippo Del Puente[17], Emanuele Pontali[17], Francesco Giuseppe De Rosa[18,19], Silvia Corcione[18], Alessandra Mularoni[20], Giovanna Russelli[20], Mauro Giacomini[21], Flavia Badalucco Ciotta[22], Chiara Oltolini[22], Francesco Saverio Serino[23], Elena Momesso[24], Michele Spinicci[25,26], Lucia Graziani[25], Carlo Torti[27,28], Enrico Maria Trecarichi[27,28], Marco Merli[29], Federico D'Amico[29], Anna Marchese[5,30], Antonio Vena[1,2] and Matteo Bassetti[1,2]† on behalf of the CARBANEW study group

Giacobbe DR et al. J Antimicrob Chemother. 2023 Aug 22:dkad262. doi: 10.1093/jac/dkad262.

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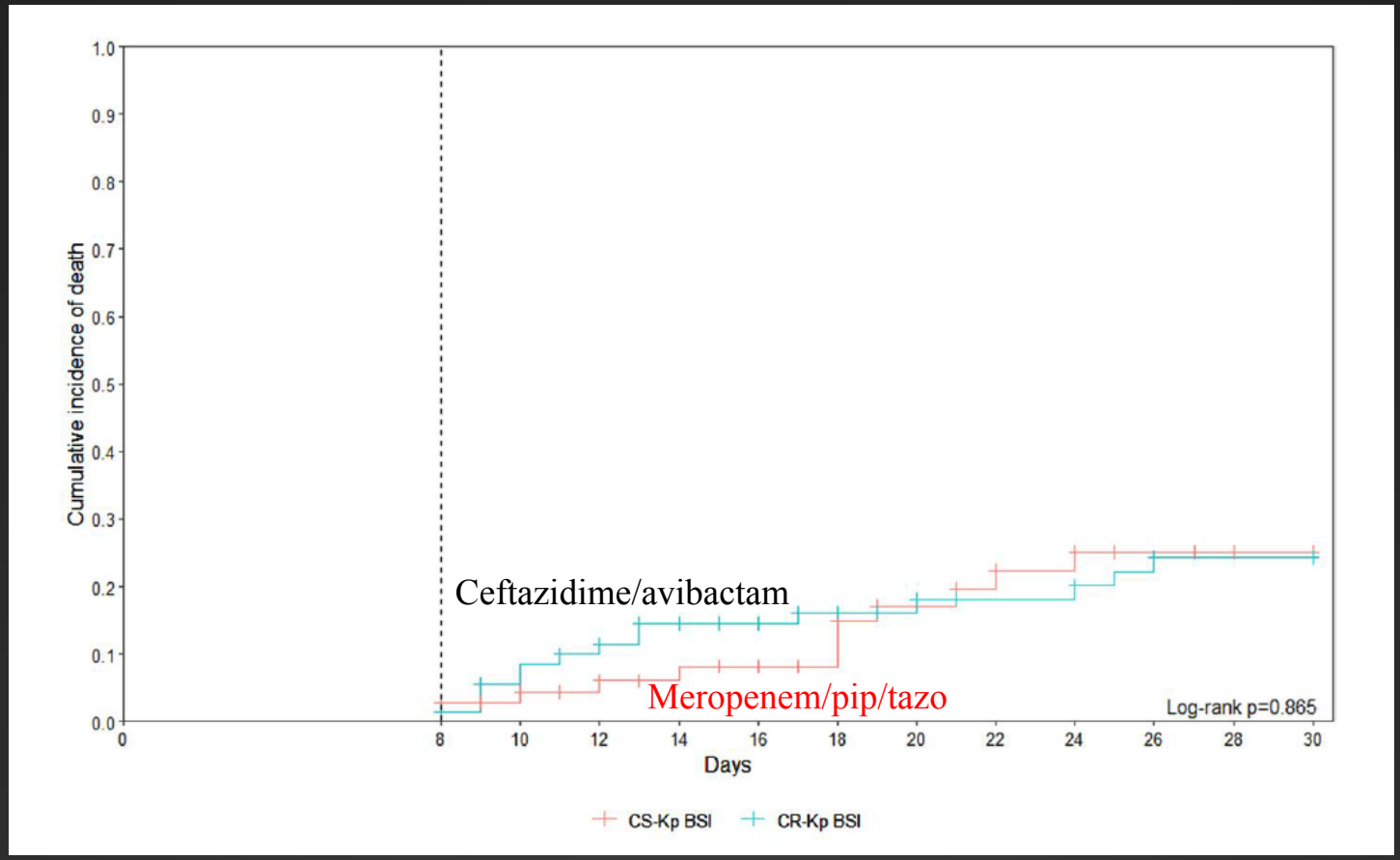
30 days mortality patients with CR-Kp BSI receiving appropriate therapy with ceftazidime/avibactam (cases) versus patients with CS-Kp BSI receiving appropriate therapy with agents other than ceftazidime/avibactam (controls).



Giacobbe DR et al. J Antimicrob Chemother. 2023 Aug 22:dkad262. doi: 10.1093/jac/dkad262.

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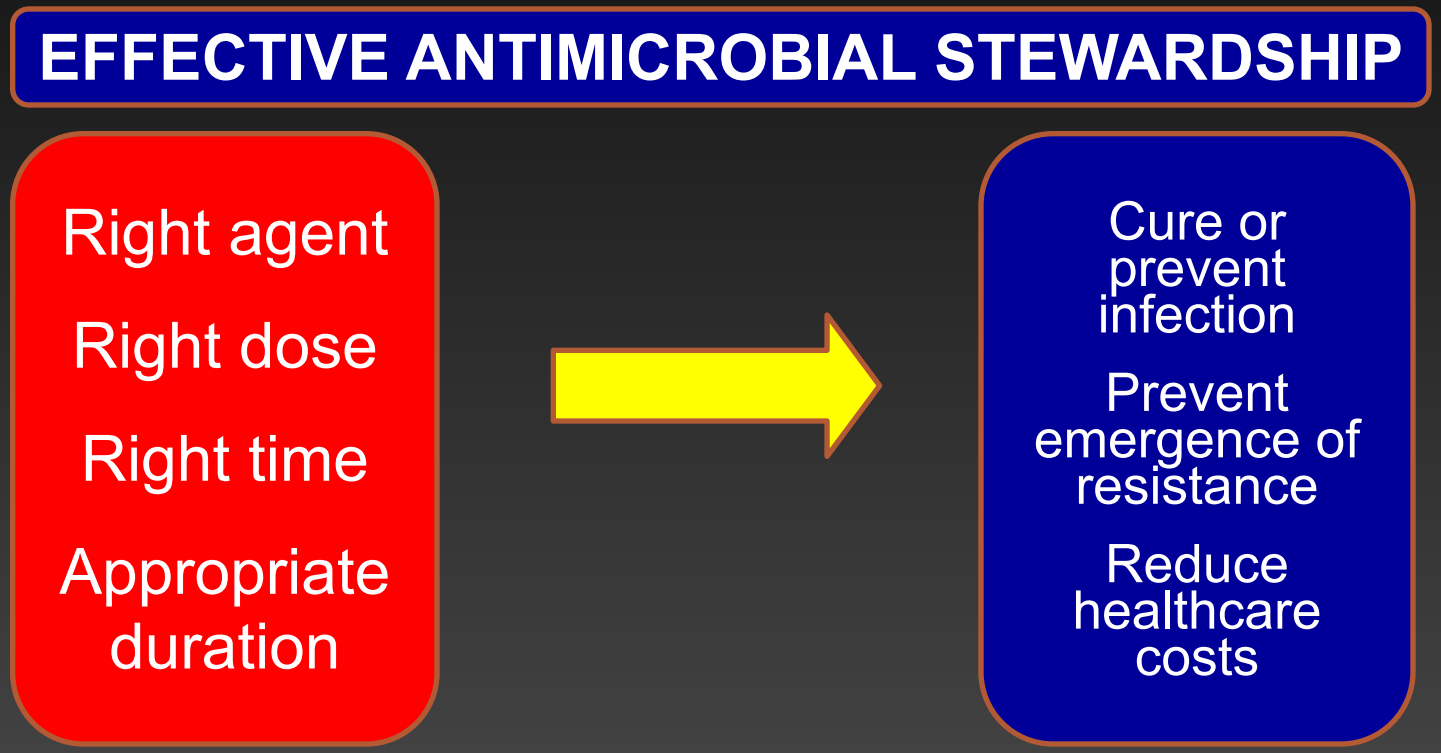
Antibiotic resistance is inevitable.

The rate of spread of resistance is not inevitable.

Hamilton-Miller JMT. *Intl J Antimicrob Agents*. 2004;23:209-212.

What are the Goals of Antimicrobial Stewardship?

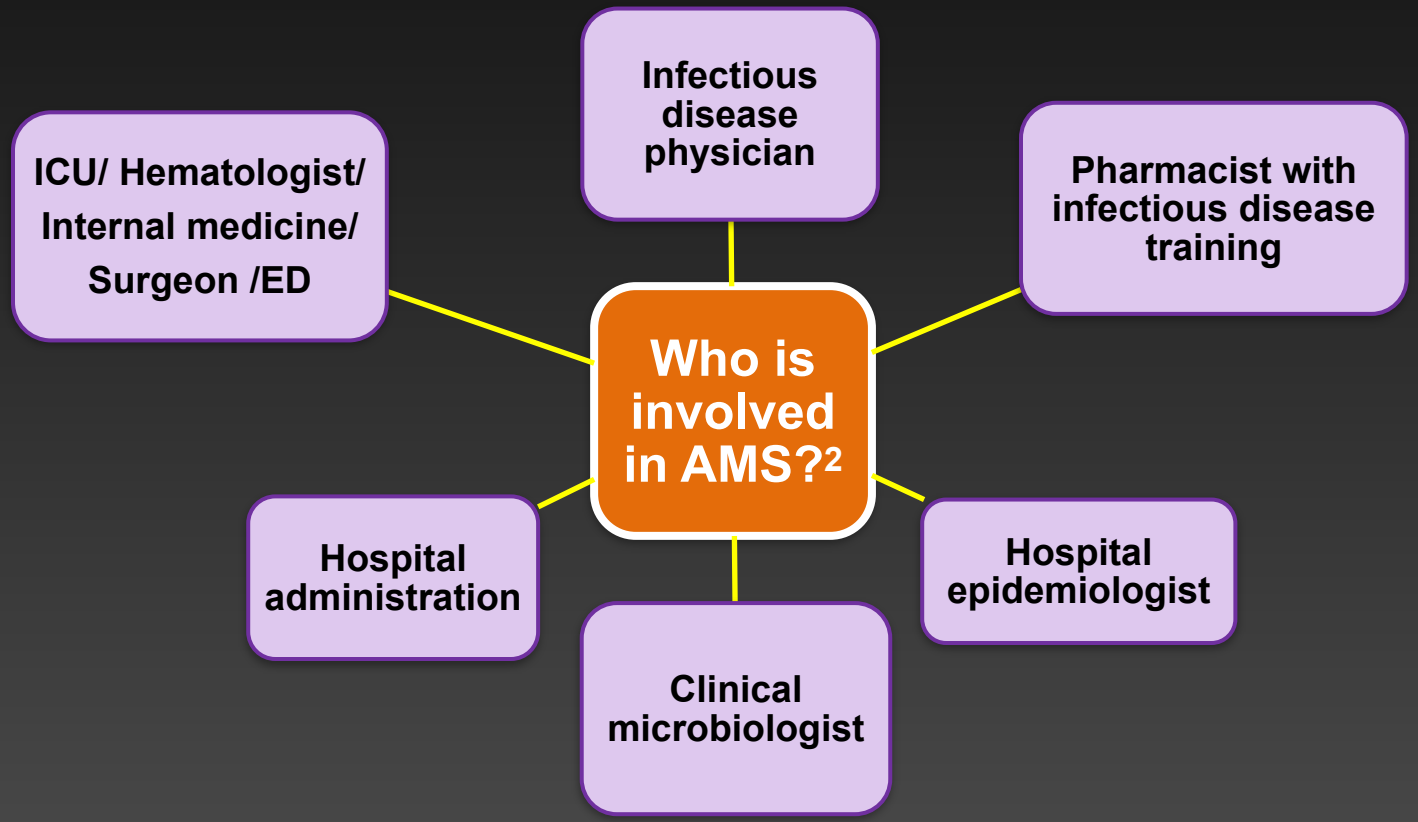
- Antimicrobial stewardship is a key strategy to overcome resistance by the careful and responsible management of antimicrobial use



1. British Society for Antimicrobial Chemotherapy. A Practical Guide to Antimicrobial Stewardship in Hospitals.

Successful stewardship involves a multidisciplinary approach

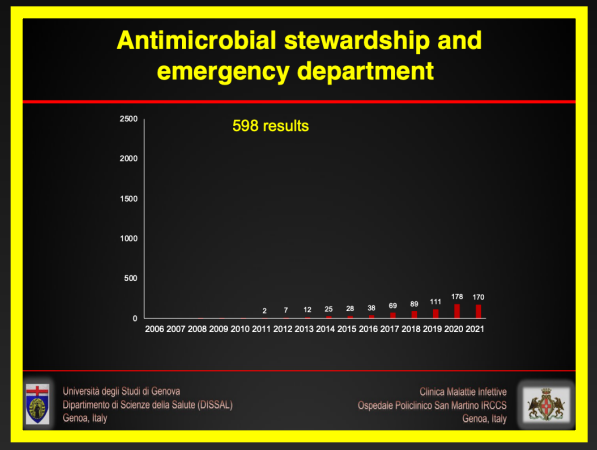
Antimicrobial stewardship is an inter-professional effort[1], involving multidisciplinary collaboration from various core members[2]

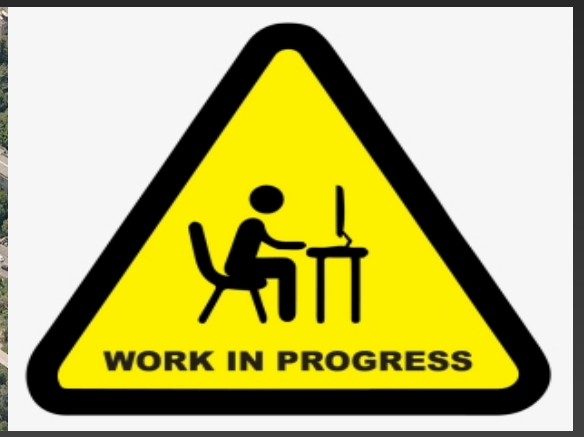


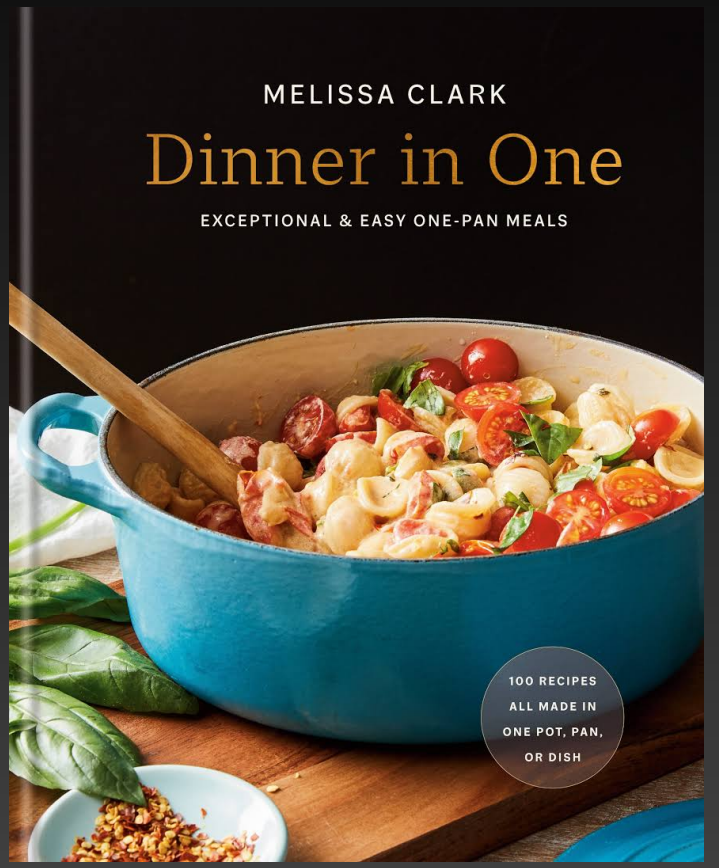
AMS, antimicrobial stewardship

1. Moody J, et al. *Am J Infect Control* 2012;40:94–5; 2. Dellit TH, et al. *Clin Infect Dis* 2007;44:159–77.

Modello San Martino







Cooking book

1. Create a collaborative group
2. Identify the barriers for AMS implementation in the ED and possible tailored approach
3. Education, implementation and dissemination of guidelines.
4. Implement rapid (not always NEW) diagnostic test
5. Let's play with the informatics!
6. Daily Peer comparison
7. follow-up of discharged patients
8. Select indicators
9. Share your success
10. Never give-up!!!

Personal opinion

10 “golden rules” for antibiotic use in critically ill patients for treating MDR infections[1]

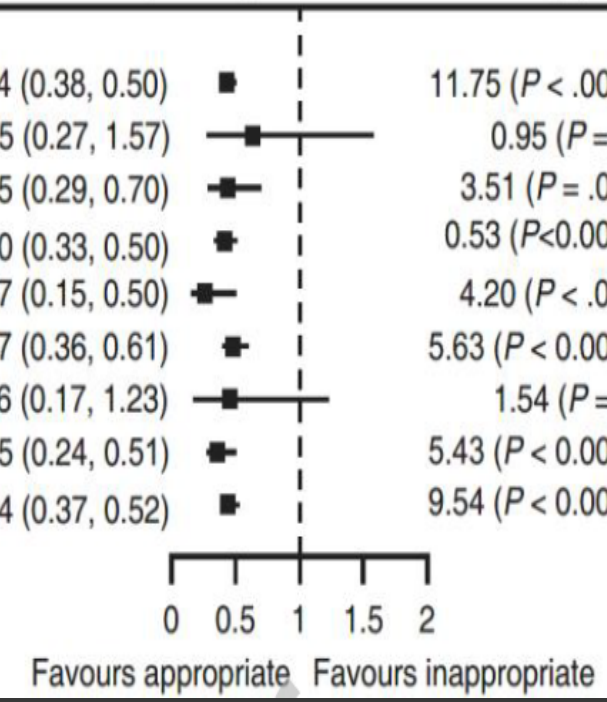
- Early appropriate for septic patients
- Impact on bacterial resistance (collateral damages)
- Improve diagnosis/diagnostics (new techniques/rapid test)
- Risk stratification
- Combination (when needed)
- Role of established antibiotics
- Drug optimisation (PK/PD)
- De-escalation (rapid)
- Duration (shorter better than longer)
- Role of new antibiotics

MDR, multidrug resistant

1. Bassetti M, personal opinion

Summary of the effect of appropriate versus inappropriate therapy on mortality

Number of studies	Subgroup	Appropriate Events	Appropriate Total	Inappropriate Events	Inappropriate Total	Weight	Odds ratio (95% CI)	Overall effect (Z)	Heterogeneity (I^2)
101	Overall	7,054	53,565	4,052	15,599	100.0%	0.44 (0.38, 0.50)	11.75 ($P < .00001$)	80%
6	2–7 days	76	928	58	471	5.4%	0.65 (0.27, 1.57)	0.95 ($P = .34$)	78%
12	14–15 days	232	1,328	371	1,061	13.1%	0.45 (0.29, 0.70)	3.51 ($P = .0004$)	74%
45	21–30 days	2,319	12,407	1,937	5,522	50.9%	0.40 (0.33, 0.50)	0.53 ($P<0.00001$)	81%
6	During ICU stay	249	810	113	194	5.5%	0.27 (0.15, 0.50)	4.20 ($P < .0001$)	57%
24	During hospital stay	3,977	37,541	1,443	8,093	25.1%	0.47 (0.36, 0.61)	5.63 ($P < 0.00001$)	81%
3	Acute pyelonephritis/UTI	50	939	49	521	3.0%	0.46 (0.17, 1.23)	1.54 ($P = .12$)	72%
19	Pneumonia	1,333	6,618	696	1,813	18.4%	0.35 (0.24, 0.51)	5.43 ($P < 0.00001$)	83%
63	Bacteraemia, sepsis or septic shock	5,497	44,291	3,039	12,084	68.4%	0.44 (0.37, 0.52)	9.54 ($P < 0.00001$)	82%



CI, confidence interval; ICU, intensive care unit; UTI, urinary tract infection

Bassetti M, *et al*. *Int J Antimicrob Agents*. 2020:106184.

Inappropriate initial antibiotic therapy leads to excess mortality

Retrospective cohort study

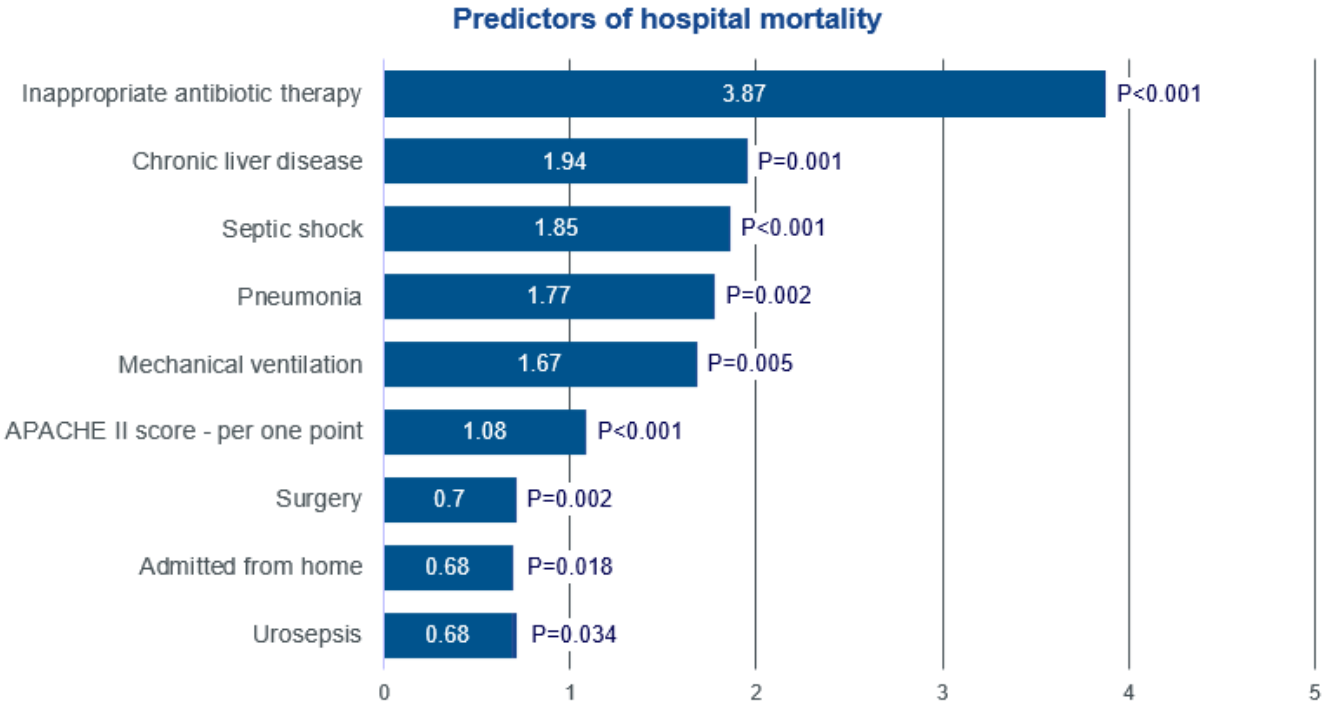
Patients with GNR bacteremia resulting in severe sepsis/septic shock

N=1064

E. coli: 26%,

K. pneumoniae: 20%,

P. aeruginosa: 16%



Inappropriate initial antibiotic therapy is a modifiable risk factor for mortality

APACHE, Acute Physiology And Chronic Health Evaluation; GNR, Gram-negative resistant. Adapted from: Zilberberg MD, et al. Crit Care. 2014;18(6):596.

De Pascale *et al. Critical Care* (2025) 29:32
https://doi.org/10.1186/s13054-025-05266-1

Critical Care

RESEARCH Open Access

Incidence of hospital-acquired infections due to carbapenem-resistant *Enterobacterales* and *Pseudomonas aeruginosa* in critically ill patients in Italy: a multicentre prospective cohort study

Gennaro De Pascale[1,2†], Andrea Cortegiani[3,4*†], Matteo Rinaldi[5,6], Massimo Antonelli[1,2], Sergio Cattaneo[7], Maurizio Cecconi[8,9], Raffaele Cuffaro[10], Lidia Dalfino[11], Filomena Di Biase[12], Abele Donati[13,14], Francesca Romana Fasano[15], Teresa Fasciana[16], Giuseppe Foti[17,18], Antonella Frattari[19], Roberto Fumagalli[20,21], Massimo Girardis[22], Leonardo Gottin[23], Alessia Mattei[24], Marta Milazzo[3], Giorgia Montrucchio[25,26], Daniela Pasero[27,28], Fabio Picciafuochi[29], Emanuela Sensi[30], Giuseppe Servillo[31], Maria Alejandra Vidal Pereira[15], Teresa Spanu[32†], Pierluigi Viale[5,6†] and on behalf of the INCREASE-IT Study Group

59,2% inappropriate empirical therapy

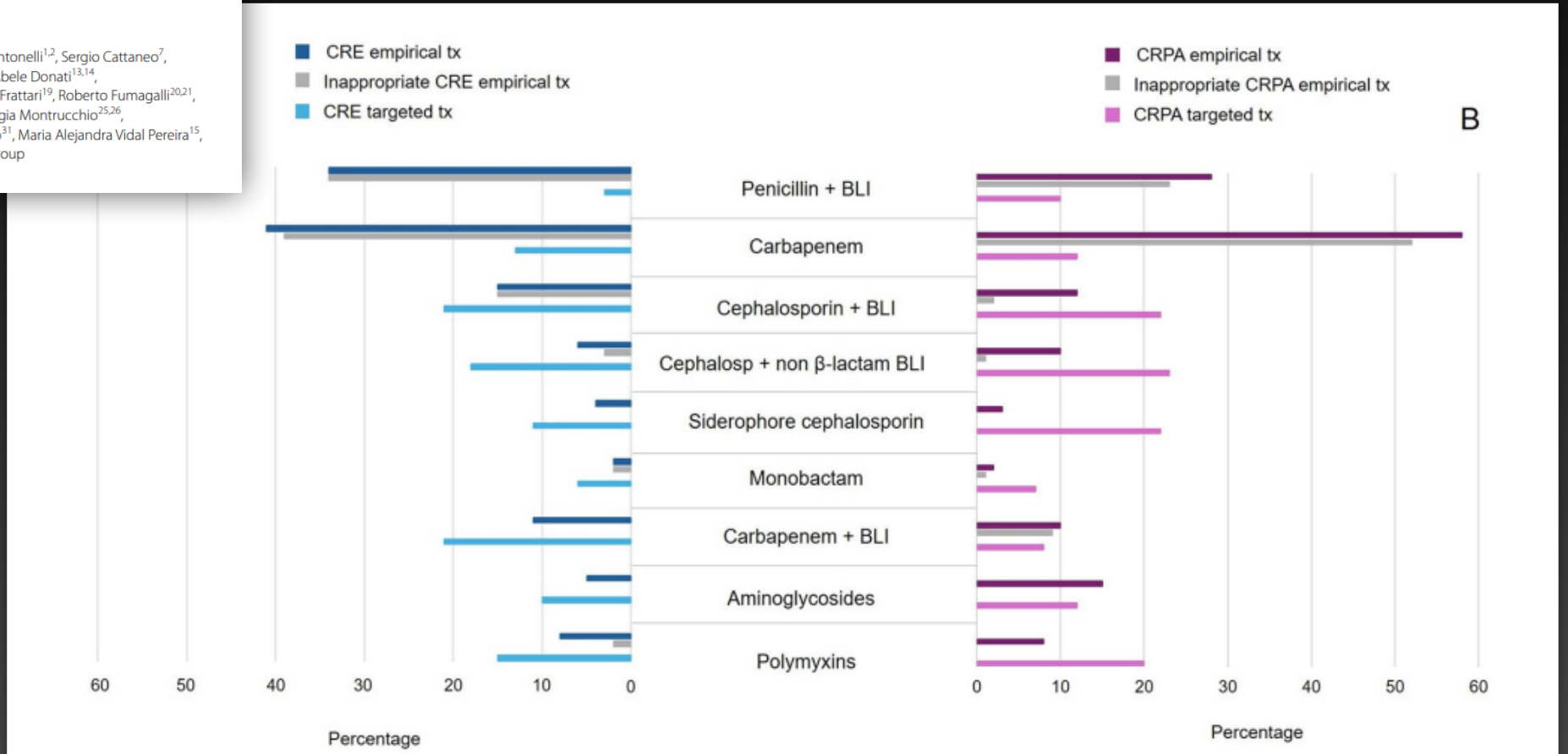


Fig. 2 Percentage of patients receiving classes of antibiotics against gram-negative bacteria as empirical, inappropriate empirical, and targeted therapy in A) CRE and B) CRPA groups

Antimicrobial Therapy: an authentic dilemma in sepsis

Appropriate initial antibiotic improves patient outcomes and healthcare and might reduce mortality

Unnecessary antibiotics adverse patient outcomes and increased resistance rate and cost

The important decision in antibiotic treatment turns out to be the choice between present and future patients

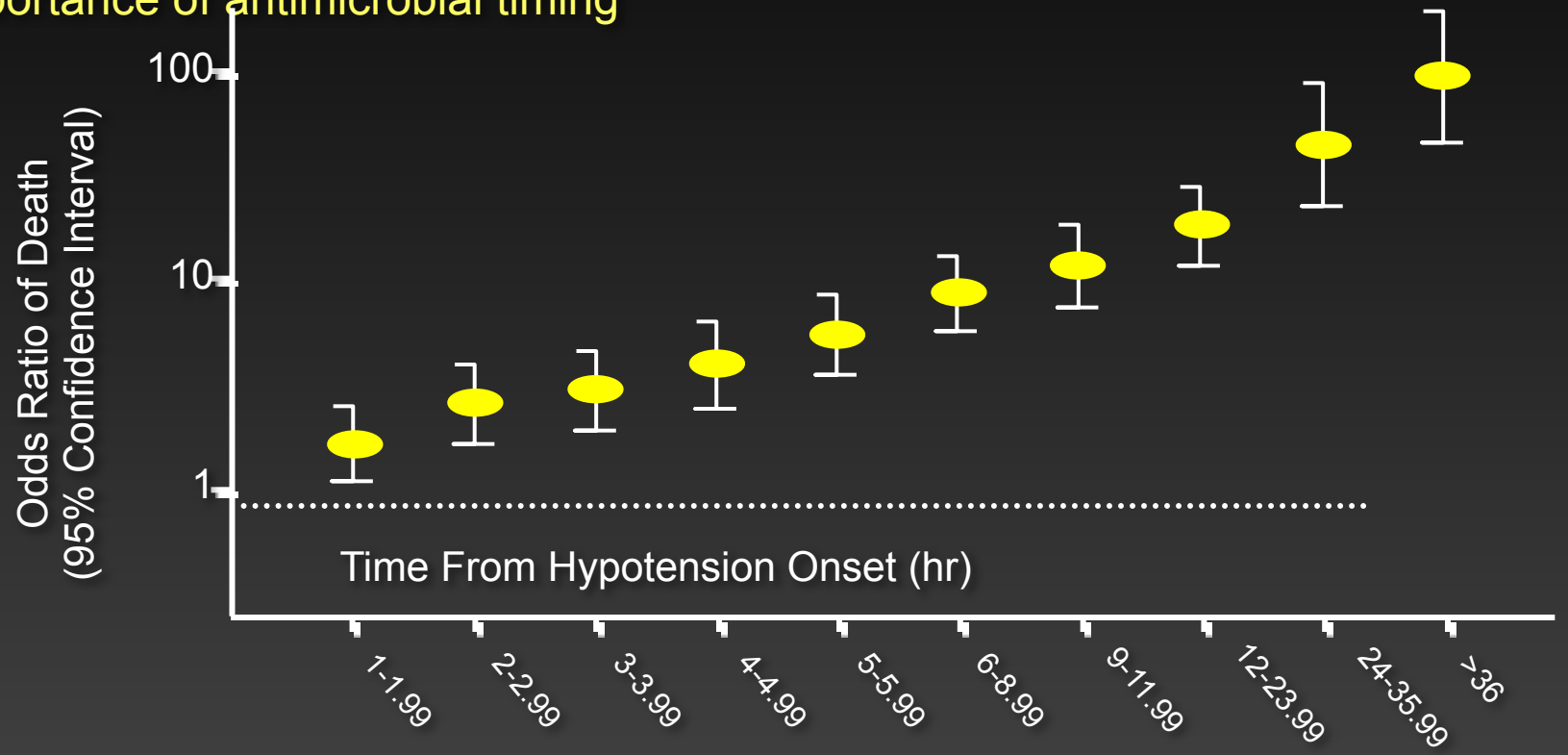
Stewardship

A Balancing Act

Think before you shoot!!

Every minute counts…..

An earlier study of septic shock (n = 2,731) explicitly demonstrated the importance of antimicrobial timing



- Every hour's delay until appropriate therapy resulted in a 12% increase in mortality
- Compared with starting appropriate therapy within 1 hour of the onset of hypotension, the OR for mortality increased from 1.67 in Hour 2 to 92.54 with delays >36 hours

Kumar A, et al. Crit Care Med. 2006;34:1589-1596.

Does Empirical Therapy Really Matter?

The NEW ENGLAND JOURNAL of MEDICINE

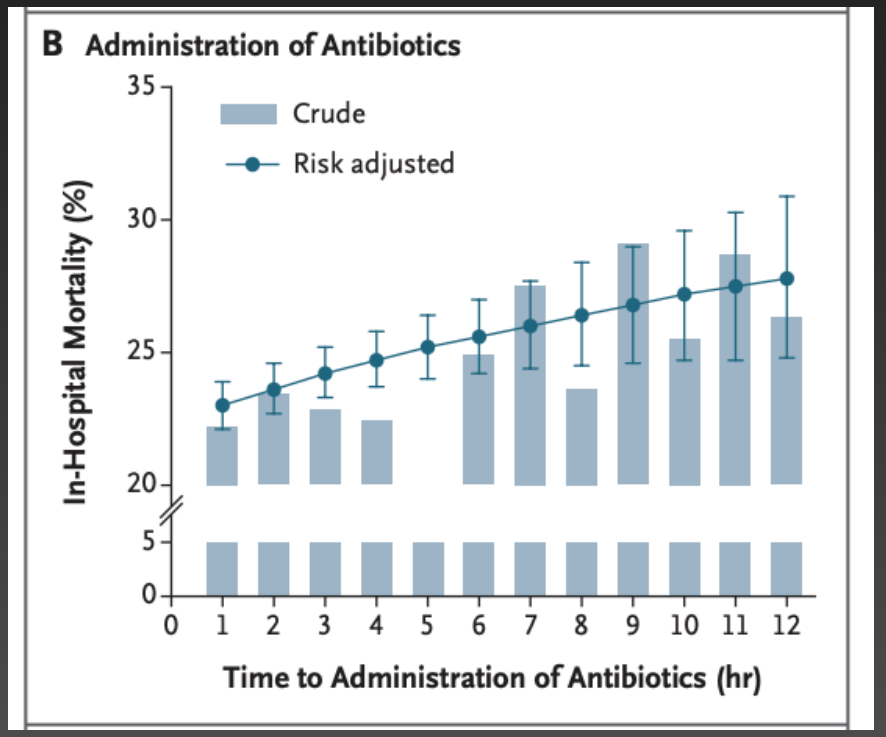
ORIGINAL ARTICLE

Time to Treatment and Mortality during Mandated Emergency Care for Sepsis

Sepsis protocol initiated within 6 hours after arrival in ED
Bundle: blood cultures, broad-spectrum antibiotic agents, and lactate measurement
49,331 patients at 149 hospitals, 82.5% had the 3-hour bundle completed within 3 hours

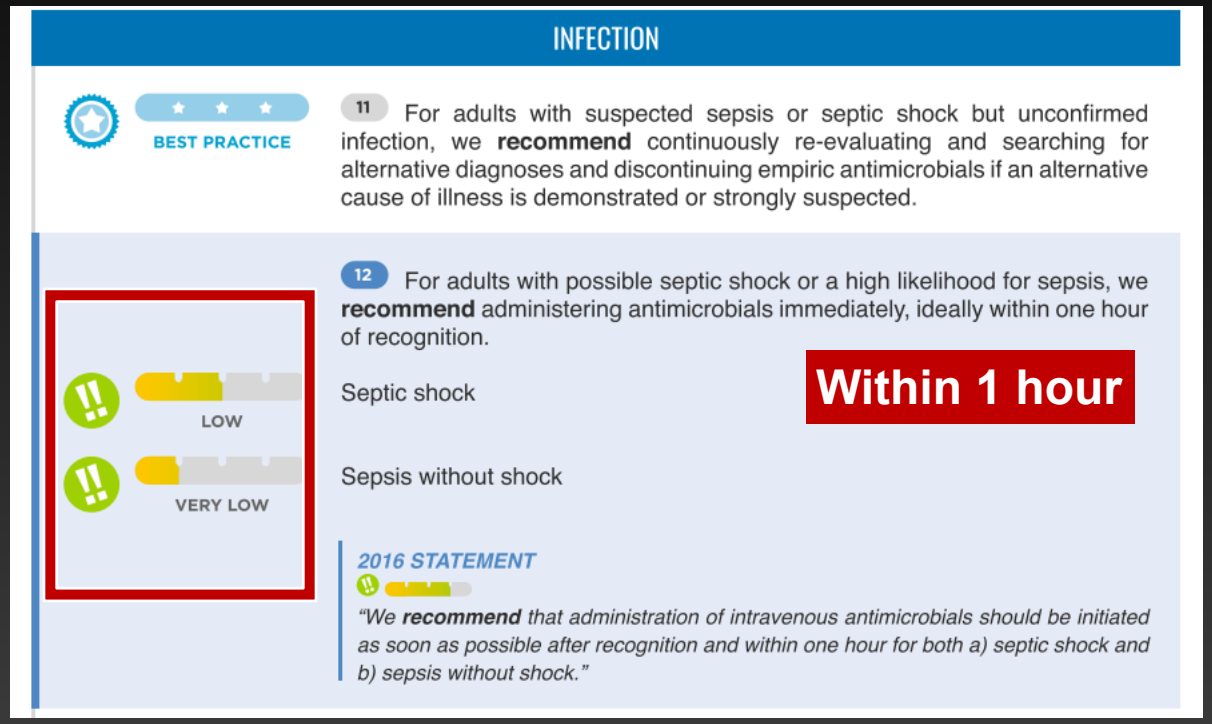
A longer time to the completion of the bundle was associated with higher risk-adjusted in-hospital mortality (OR, 1.04 per hour; 95% CI, 1.02 to 1.05; P<0.001)

A longer time to the administration of antibiotics (OR, 1.04 per hour; 95% CI, 1.03 to 1.06; P<0.001)

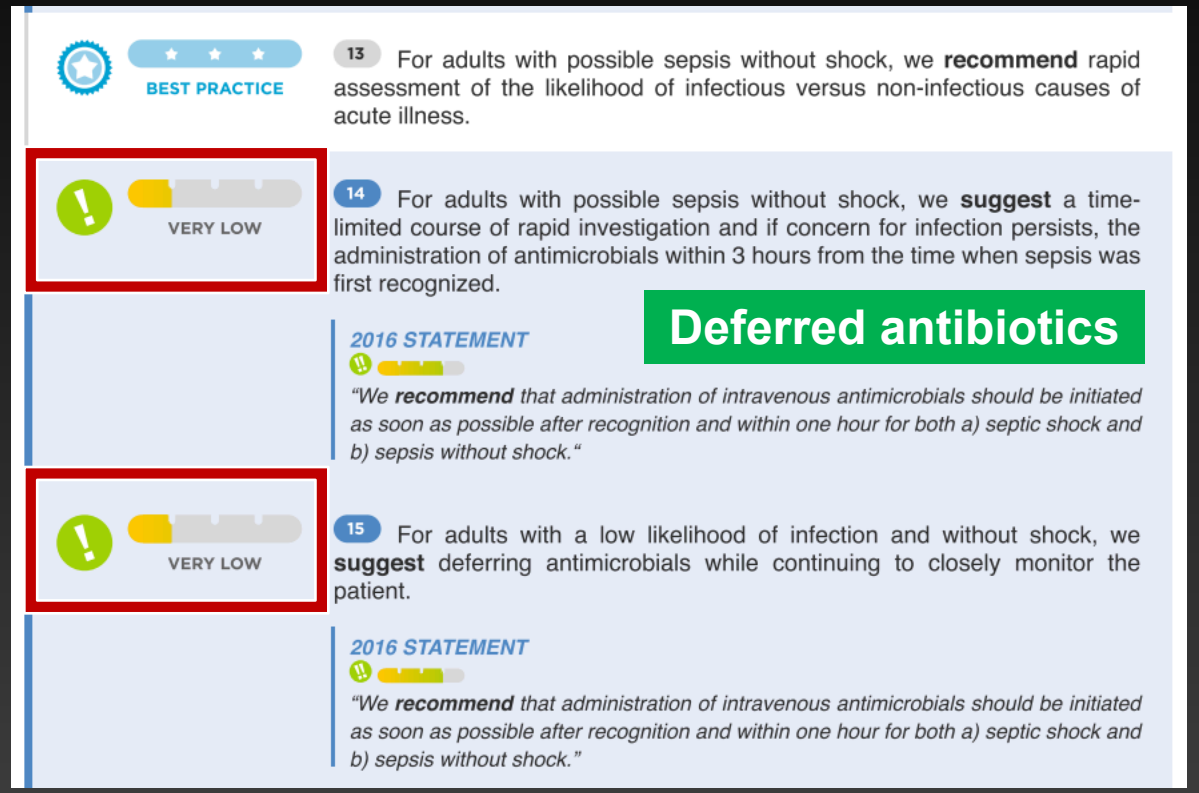


Seymour et al. *N Engl J Med*. 2017

Disease severity evaluation



SEPTIC SHOCK



SEPSIS WITHOUT SHOCK

Evans L, et al. Intensive Care Med. 2021

Association Between Delayed Broad-Spectrum Gram-negative Antibiotics and Clinical Outcomes: How Much Does Getting It Right With Empiric Antibiotics Matter?

Jonathan D. Baghdadi,[1,2] Katherine E. Goodman,[1,2] Laurence S. Magder,[1] Kimberly C. Claeys,[3] Mark E. Sutherland,[4] and Anthony D. Harris[1,2]

Retrospective observational cohort study in USA

GROUP 1) Early broad-spectrum therapy (EBT): Broad-spectrum GN empiric therapy
GROUP 2) Delayed broad-spectrum therapy (DBT): Early narrow spectrum GN empiric therapy → **ESCLATED** to broad-spectrum post-empiric therapy

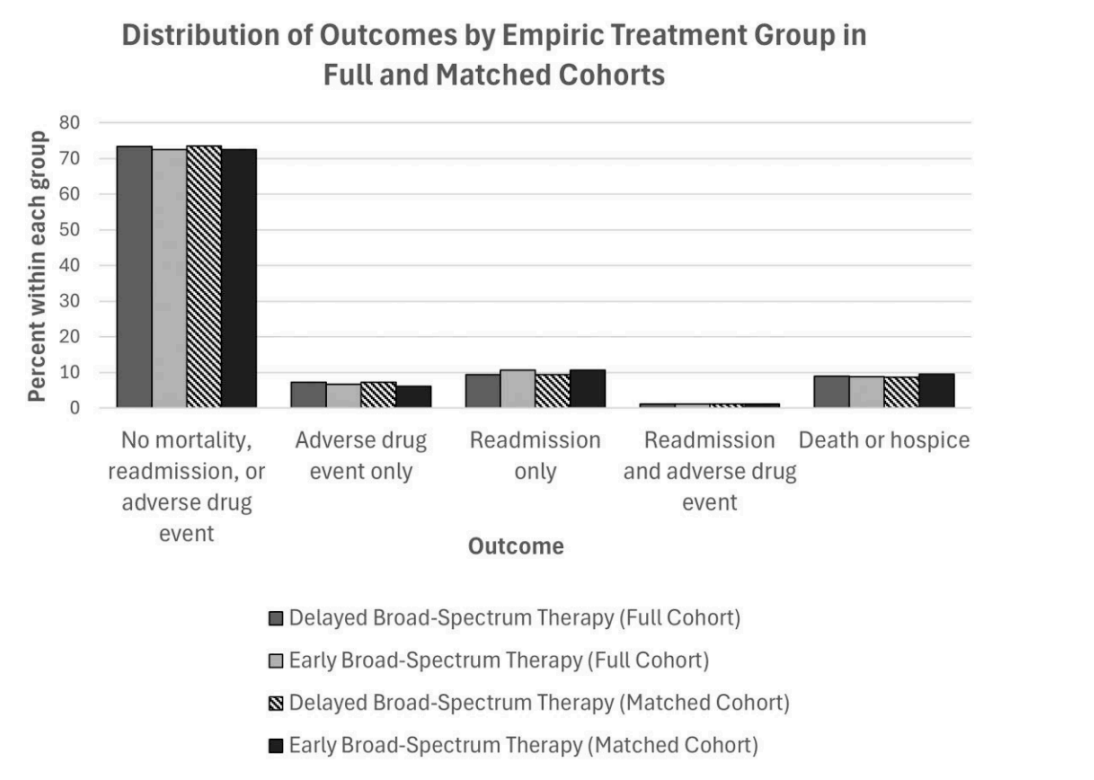
ESCALATION for ANY reason: isolation of a resistant pathogen from clinical culture, lack of clinical response to empiric therapy, drug toxicity, or clinician preference

Limited Spectrum[a]	Narrow Spectrum	Broad Spectrum	Very Broad Spectrum
• 2nd generation cephalosporins • Amoxicillin • Ampicillin • Metronidazole	• 3rd generation cephalosporins • Amoxicillin/clavulanate • Ampicillin/sulbactam	• 4th generation cephalosporins • Anti-pseudomonal penicillins • Aztreonam • Ertapenem • Ceftaroline • Fluoroquinolones • Aminoglycosides • Colistimethate	• Anti-pseudomonal carbapenems • Tigecycline • Ceftazidime/avibactam • Ceftolozane/tazobactam • Imipenem/cilastatin/relebactam • Meropenem/vaborbactam • Cefiderocol • Eravacycline

Baghdadi JD, et al., *Clin Infect Dis*. 2025

Impact of early broad spectrum EAT

EBT in 664 604 (**89.0%**) → mainly piperacillin/tazobactam (41.5% of 664 604)
DBT in 82 276 (**11.0%**) → mainly a third-generation cephalosporin (84.3% of 82 276)



Overall Cohort

- **No difference in mortality** (8.9% for DBT, 8.8% for EBT; P = .59)
- **Readmission less frequent** after DBT than EBT (10.6% vs 11.9%, P < .0001)
- **AEs more frequent** after DBT than EBT (8.4% vs 7.9%, P < .0001).

DOOR ANALYSIS of matched patients (response=in-hospital mortality+30-day readmission+AEs)
clinical outcomes superior in DBT vs EBT
(win-ratio 1.06; P < .0001)

Baghdadi JD, et al., *Clin Infect Dis*. 2025

Impact of early broad spectrum EAT

ACCORDING TYPE OF INFECTION

Superior clinical outcomes after DBT compared with EBT
(**UTI**: win ratio 1.05, P = .0062; **Pneumonia**: win ratio 1.09, P < .0001).

Critically Ill[a]

DOOR	Outcome	All DBT (n = 16 532)	All EBT (n = 163 219)	Matched[b] DBT (n = 11 789)	Matched EBT (n = 11 789)
1	No mortality, readmission, or ADE	9845 (59.6%)	97 457 (59.7%)	6956 (59.0%)	6961 (59.1%)
2	ADE only	1946 (11.8%)	17 216 (10.6%)	1408 (11.9%)	1237 (10.5%)
3	Readmission only	1414 (8.6%)	15 507 (9.5%)	1002 (8.5%)	1131 (9.6%)
4	Readmission and ADE	316 (1.9%)	3036 (1.9%)	230 (2.0%)	204 (1.7%)
5	Death or hospice	3011 (18.2%)	30 003 (18.4%)	2193 (18.6%)	2256 (19.1%)

Critically ill matched win ratio = 1.02 favoring DBST (*P* = .33)

Non-critically Ill

DOOR	Outcome	All DBT (n = 65 744)	All EBT (n = 501 385)	Matched DBT (n = 53 199)	Matched EBT (n = 53 199)
1	No mortality, readmission, or ADE	50 503 (76.8%)	385 100 (76.8%)	40 860 (76.7%)	40 304 (75.8%)
2	ADE only	4001 (6.1%)	27 174 (5.4%)	3266 (6.1%)	2819 (5.3%)
3	Readmission only	6341 (9.6%)	55 397 (11.1%)	5127 (9.6%)	5901 (11.1%)
4	Readmission and ADE	622 (6.5%)	5201 (1.0%)	511 (1.0%)	488 (0.9%)
5	Death or hospice	4277 (6.5%)	28 513 (5.7%)	3435 (6.5%)	3687 (6.9%)

Non-critically ill matched win ratio = 1.06 favoring DBST (*P* < .0001)

Critical illness in the first 2 days: 9.2% in DBT and 90.8% in EBT
Equivalent clinical outcomes
(win ratio 1.02 non-significantly favoring DBT, P = .33)

Non-critical illness:
superior clinical outcomes after DBT vs EBT
(win ratio 1.06, P < .0001)

Baghdadi JD, et al., *Clin Infect Dis*. 2025

For definitive therapy?

46/71 (64.8%) received adequate definitive monotherapy

25/71 (35.2%) received adequate definitive combination therapy

Table 2. Univariate Cox models for 30-day all-cause mortality in patients with septic shock due to *P. aeruginosa* BSI

Variable	Alive ($n=50$)	Dead ($n=48$)	HR	95% CI	*P* value
Definitive therapy, *n* (%)[e]					
Adequate monotherapy	30 (60.0)	16/21 (76.2)	Ref.	Ref.	Ref.
Adequate combination therapy	20 (40.0)	5/21 (23.8)	0.48	0.17–1.31	0.152
Need for CRRT after *P. aeruginosa* septic shock	6 (12.0)	7 (14.6)	1.06	0.47–2.35	0.896

Univariate analysis: **similar risk of death** (HR 0.48; 95% CI 0.17–1.31; P = 0.152)
Multivariate Cox regression analysis: 30-day all-cause mortality did not significantly differ between ADCT and ADMT (aHR 0.73; 95% CI 0.25–2.14; P = 0.568)

Vena A, et al. J Antimicrob Chemother. 2024

Towards Personalized Empirical Therapy

Broad EAT

Tailored EAT

Clinical severity

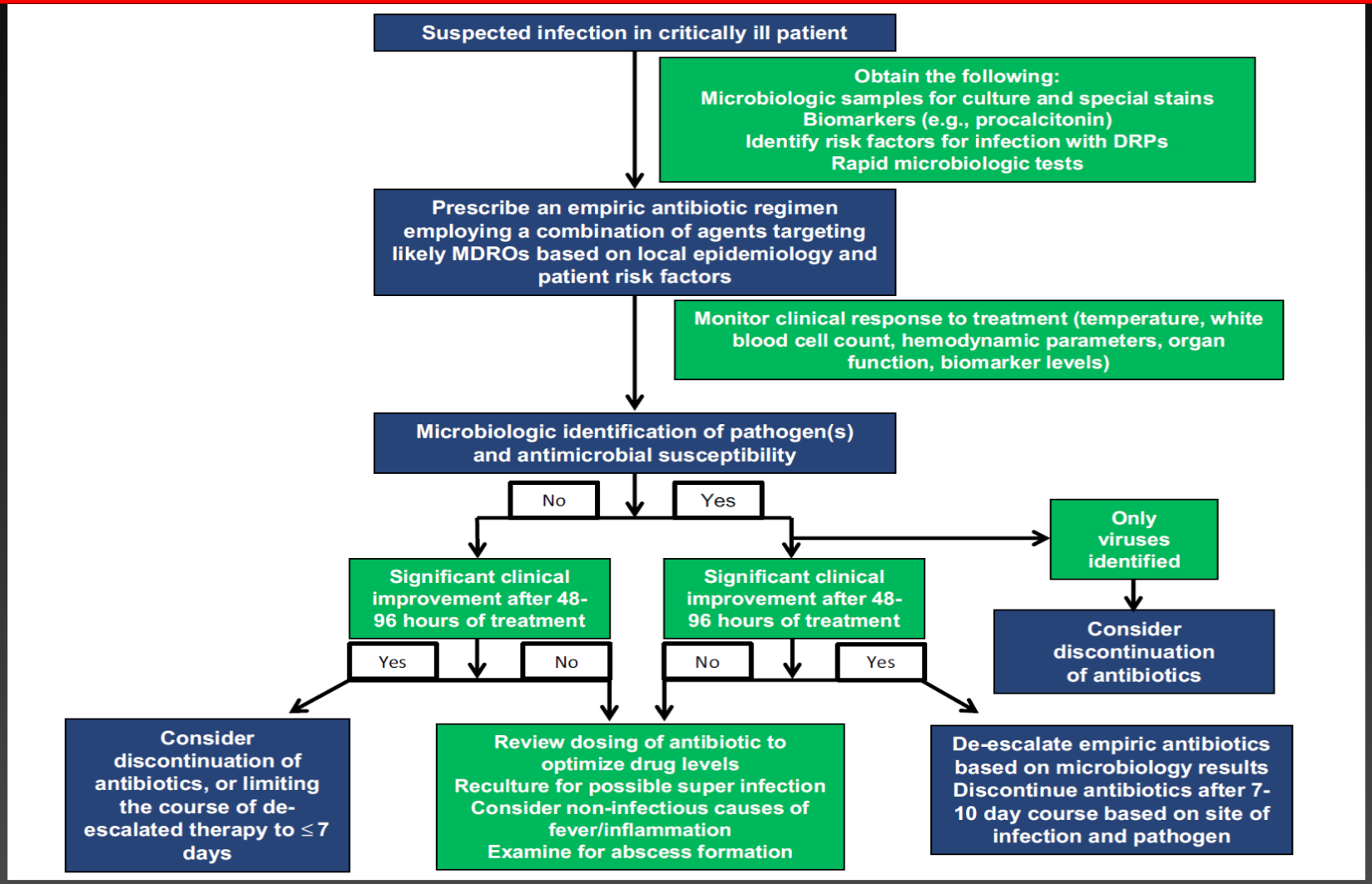
Local epidemiology

Prior colonization

Rapid tests

Clinician's anxiety

Scheme of treatment in critically ill patients



Bassetti M et al. *Intensive Care Med.* 2017 Sep 12. doi: 10.1007/s00134-017-4922-x

Risk factors for resistant organisms[1]

Table 2. Risk factors for antimicrobial-resistant Gram-negative bacteria.

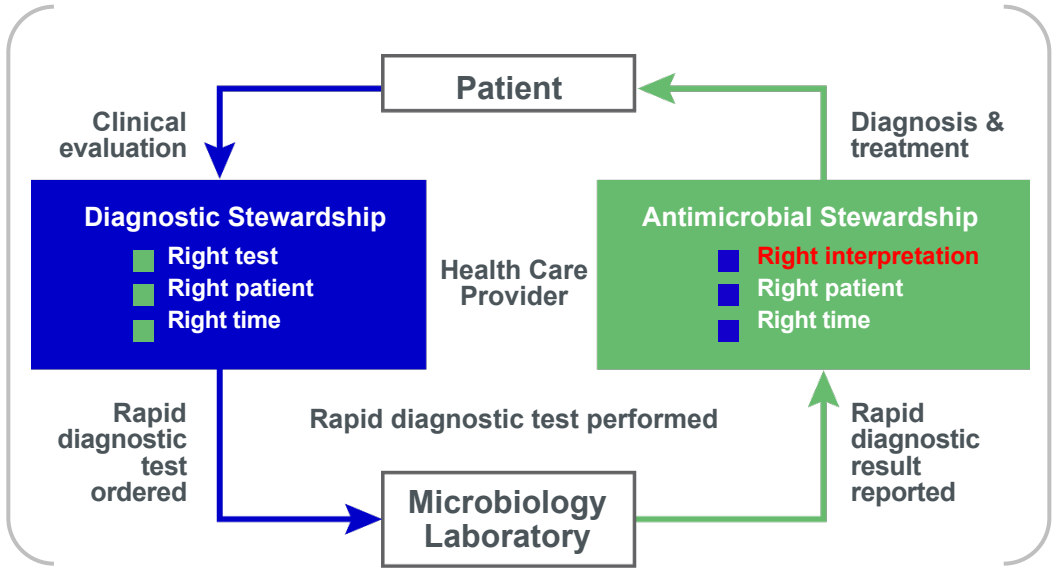
Risk factors for MDR pathogens				
Baseline characteristics	Epidemiological background	Recent (<3 months) antibiotic therapy	Prior colonization	Indwelling devices
• Age >70 years	• Prior hospital admission (in the last 12 months)	• Recent aminopenicillins	• Gut colonization with ESBL	• Urinary catheter
• Diabetes mellitus	• Prolonged hospitalization	• Recent cephalosporins	• Gut colonization with CRE	• Gastrostomy or jejunostomy
• Charlson index ≥3	• Transfer from another health-care facility	• Recent fluoroquinolones	• Colonization with MRSA	• Nasogastric tube
• Recurrent or obstructive UTIs	• Current or prior ICU admission	• Recent carbapenems	• Colonization with *Acinetobacter*	• CVC
• Use of corticosteroids	• Local epidemiology, outbreak	• Recent aminoglycosides	• Endotracheal colonization with *P. aeruginosa*	• Mechanical ventilation
• Immunosuppression • Trauma • Malignancy • Organ transplantation • COPD • Neutropenia • Recent surgery	• Travel from high endemic area[a]			• Hemodialysis

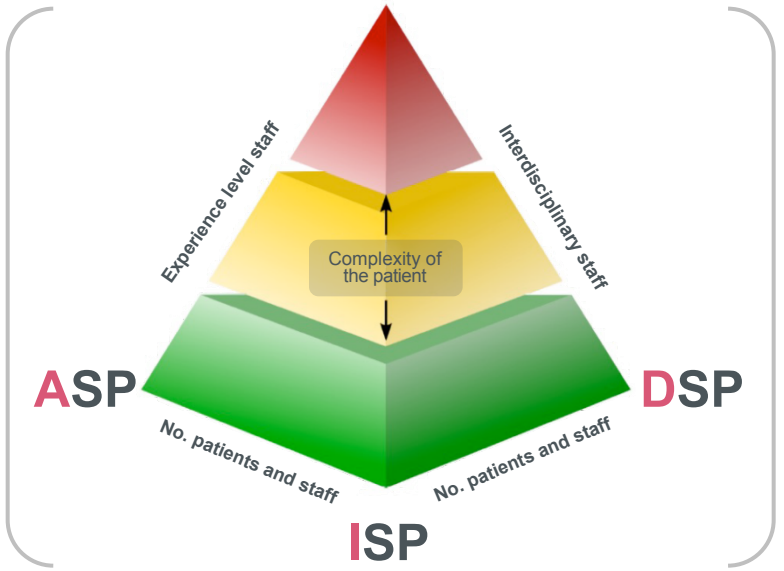
Table adapted from Bassetti M, et al. 2017

[a]Central and western Asia for ESBL; USA, Italy, Greece, and Israel for K. pneumoniae carbapenemases; Greece for VIMs; Turkey for OXA-48; and the Indian subcontinent for New Delhi metallo-beta-lactamases.
COPD, chronic pulmonary obstructive disease; CRE, carbapenem-resistant Enterobacteriaceae; CVC, central venous catheter;
ESBL, extended-spectrum β-lactamase; ICU, intensive care unit; MDR, multidrug-resistant; MRSA, methicillin-resistant *S. aureus*; Tx, treatment;
UTI, urinary tract infection.

1. Bassetti M, et al. Expert Rev Anti Infect Ther 2017;15(1):55–65.

Interactions Between Antimicrobial Stewardship, Diagnostic Stewardship and Infection Prevention





Adapted from Messacar et al. *J. Clin. Microbiol*. 2017;55:715-723

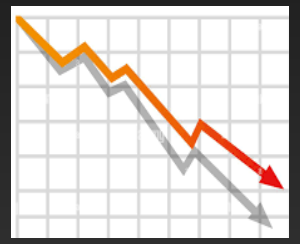
Critical importance of integrating rapid diagnostics not only with individual patient management but with infection prevention modalities such as ensuring minimal unnecessary time spent in isolation, best use of scant infection prevention resources.

ASP, antimicrobial stewardship program; DSP, diagnostic stewardship program; ISP, infection prevention stewardship program.

1. Messacar K, et al. *J Clin Microbiol*. 2017;55(3):715-723. 2. Dik JH, et al. *J Clin Microbiol*. 2017;55(11):3306-3307.

Impact of mPCR + Antimicrobial Stewardship in RCTs

Higher de-escalation rate vs. conventional culture: **42% vs. 8%**

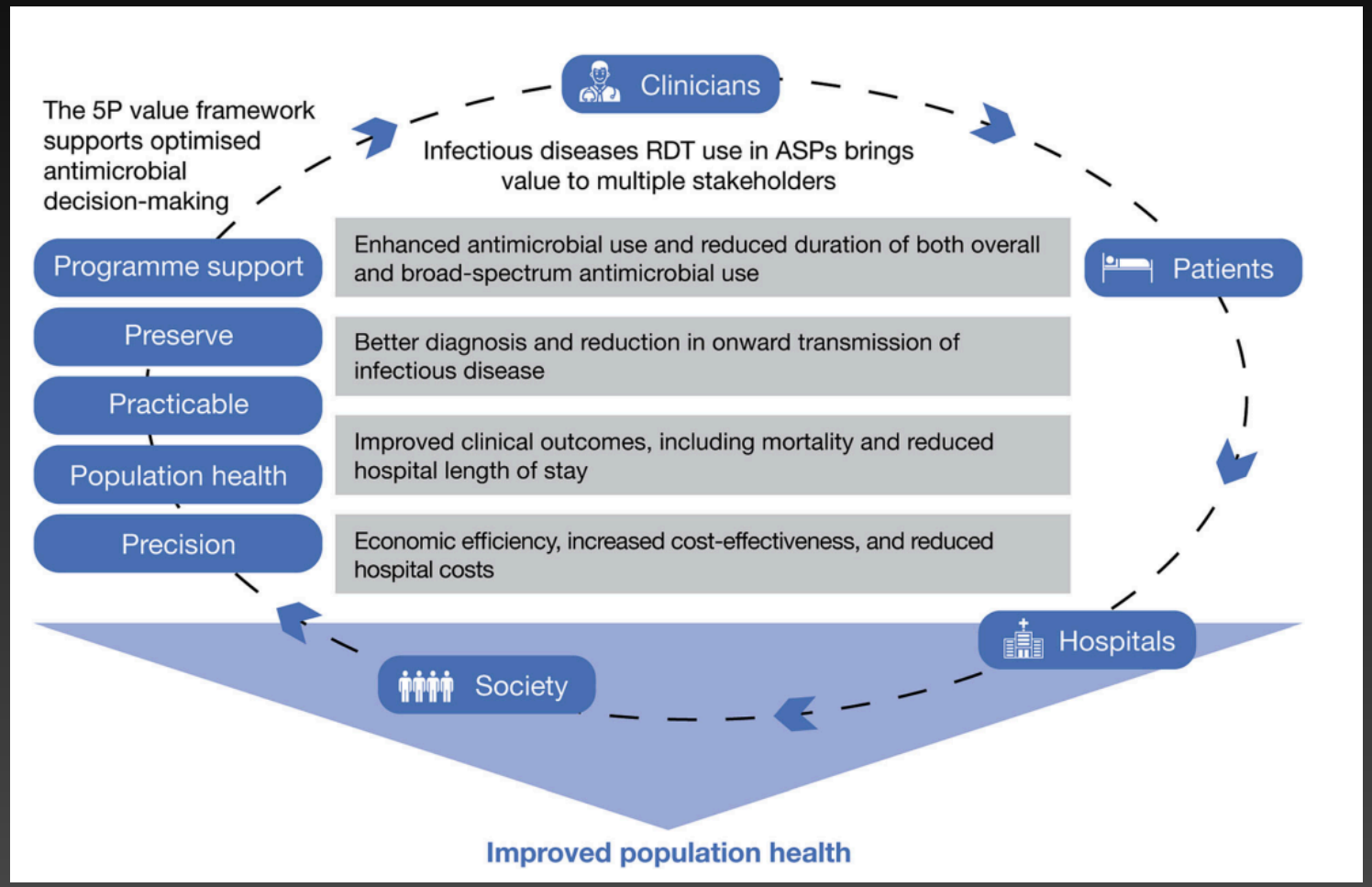


45% shorter inappropriate therapy duration (too long, broad, or inadequate)

No impact on clinical outcomes (cure rate, hospital stay, mortality, adverse events)

Poole S. et al. J Infection 2022
Fartoukh M. et al Clin Microbiol Infect 2023
Virk A, et al. Lancet Microbe. 2024.
Enne IV Intensive Care Med 2025

RDTs in AMS Strategies



Karri *et al.*, *Clinical Infectious Diseases*, 2014;
Moore *et al. Infectious diseases and therapy,* 2023.

AMS GOALS

- ACCELERATE PATHOGEN IDENTIFICATION
- OPTIMIZE ANTIMICROBIAL PRESCRIBING
- ACCELERATE DE-ESCALATION STRATEGIES
- CONTRIBUTE TO SURVEILLANCE AND EPIDEMIOLOGY
- PROMOTE COST-EFFECTIVE HEATHCARE

DE-ESCALATION

Replacing broad-spectrum antimicrobials with agents of a narrower spectrum or a lower ecological impact

or

Stopping components of an antimicrobial combination

Stopping of an antimicrobial agent administered in combination therapy to provide double cover for certain pathogens

Stopping of an antimicrobial agent administered to cover pathogens that are not finally isolated in the clinical cultures

Empirical antimicrobials

PIVOTAL ANTIMICROBIAL

COMPANION ANTIMICROBIAL if necessary

De-escalation

Companion antimicrobial: stopped or becomes pivotal

Pivotal antibicrobial: Change in spectrum

Tabah, Bassetti, et al. Intensive Care Med, 2020

DE-ESCALATION

- Scarcity of adequate evidence on its efficacy and safety

29. For adults with sepsis or septic shock, we suggest daily assessment for de-escalation of antimicrobials over using fixed durations of therapy without daily reassessment for de-escalation.	***Weak,*** *very low quality of evidence*

Surviving Sepsis Campaign, Crit Care Med 2021

Efficacy and safety of a structured de-escalation from antipseudomonal β-lactams in bloodstream infections due to Enterobacterales (SIMPLIFY): an open-label, multicentre, randomised trial

- RCT
- 21 Spanish Hospitals
- Oct 2016 - Jan 2020
- De-escalation within 48–72 h of susceptibility results (≈3–5 days after empirical therapy start)

López-Cortés, et al. Lancet 2024

	De-escalation group (n=164)	Control group (n=167)
Acquisition type		
Community-acquired	89 (54%)	79 (47%)
Community-onset, health care-associated	48 (29%)	44 (26%)
Nosocomial	27 (17%)	44 (26%)
Severity of infection at presentation		
Severe sepsis	31 (19%)	28 (17%)
Septic sock	17 (10%)	7 (4%)
Source of bacteraemia		
Biliary tract	62 (38%)	67 (40%)
Urinary tract	61 (37%)	65 (39%)
Abdominal (other than biliary tract)	16 (10%)	14 (8%)
Vascular catheter	7 (4%)	12 (7%)
Skin and skin structure	4 (2%)	0
Respiratory tract	2 (1%)	2 (1%)
Other	2 (1%)	1 (1%)
Unknown	10 (6%)	6 (4%)
Cause of bacteraemia		
Escherichia coli	103 (63%)	112 (67%)
Klebsiella pneumoniae	30 (18%)	24 (14%)
Klebsiella oxytoca	9 (6%)	7 (4%)
Enterobacter cloacae	3 (2%)	11 (7%)
Proteus mirabilis	6 (4%)	7 (4%)
Other	13 (8%)	6 (4%)

	De-escalation group (n=164)	Control group (n=167)
Empirical drugs used		
Imipenem or meropenem	45 (27%)	47 (28%)
Piperacillin–tazobactam	104 (63%)	107 (64%)
Cefepime or ceftazidime	14 (9%)	11 (7%)
Aztreonam	1 (1%)	2 (1%)
De-escalation intravenous drug		
Ampicillin	23 (14%)	NA
Trimethoprim–sulfamethoxazole	6 (4%)	NA
Cefuroxime	23 (14%)	NA
Cefotaxime or ceftriaxone	52 (32%)	NA
Amoxicillin–clavulanic acid	24 (15%)	NA
Ciprofloxacin	18 (11%)	NA
Ertapenem	18 (11%)	NA
Switched to oral drugs	96 (59%)	118 (71%)
Ciprofloxacin	21 (20%)	97 (78%)
Cefuroxime	26 (25%)	17 (14%)
Amoxicillin	19 (18%)	1 (1%)
Amoxicillin–clavulanic acid	17 (17%)	4 (3%)
Cefixime	14 (14%)	1 (1%)
Trimethoprim–sulfamethoxazole	6 (6%)	2 (2%)
Ertapenem	0	2 (2%)

Efficacy and safety of a structured de-escalation from antipseudomonal β-lactams in bloodstream infections due to Enterobacterales (SIMPLIFY): an open-label, multicentre, randomised trial

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López-Cortés, et al. Lancet 2024

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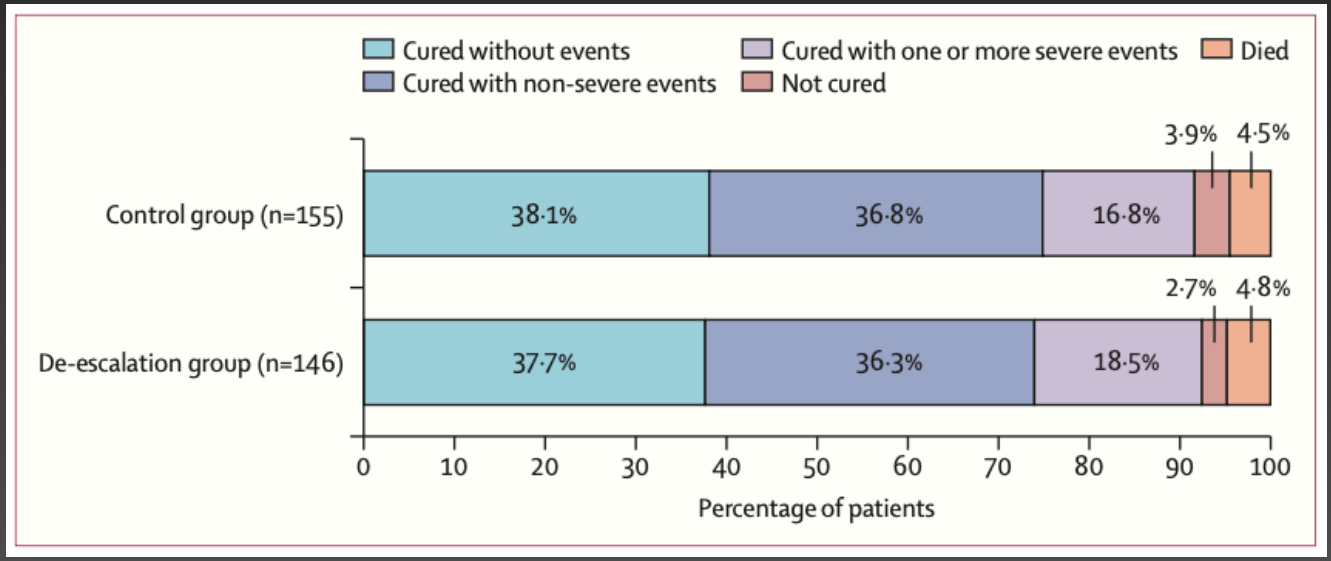
Ertapenem	0	2 (2%)

	De-escalation group	Control group	Difference in percentage points (two-sided 95% CI)
Primary analysis (modified intention-to-treat population)			
Clinical cure at test of cure	148/164 (90%)	148/167 (89%)	1·6 (–5·0 to 8·2)
Reasons for not reaching clinical cure at test of cure			
Clinical failure	7/164 (4%)	12/167 (7%)	–2·9 (–7·9 to 2·1)
Missed assessment	6/164 (4%)	5/167 (3%)	0·7 (–3·2 to 4·6)
Withdrawn due to adverse events	3/164 (2%)	2/167 (1%)	0·6 (–2·0 to 3·2)
Secondary analysis			
Clinical cure at test of cure (clinically evaluable population)	143/148* (97%)	144/156† (92%)	4·3 (–0·9 to 9·5)
Microbiological cure at test of cure (microbiologically evaluable population)	124/128 (97%)	125/132 (95%)	2·2 (–2·7 to 7·1)
Clinical cure at day 60	142/153‡ (93%)	144/160§ (90%)	2·8 (–3·4 to 9·0)
Recurrence until day 60	9/153‡ (6%)	18/160§ (11%)	–5·5 (–11·6 to 0·8)
Death at day 60	7/153‡ (5%)	9/160§ (6%)	–1·0 (–5·9 to 3·9)
Clostridioides difficile infection until day 60	1/153‡ (1%)	1/160§ (1%)	0·10 (–1·7 to 1·9)

Data are n (%). *16 patients were excluded from the modified intention-to-treat population for not completing 5 days of treatment (n=13) or for missing the assessment at test of cure (n=3). †11 patients were excluded from the modified intention-to-treat population due to not completing 5 days of treatment (n=6), being withdrawn due to adverse events (n=2), or missing the assessment at test of cure (n=3). ‡11 patients excluded from the modified intention-to-treat population due to missed assessment at day 60. §Seven patients excluded from the modified intention-to-treat population due to missed assessment at day 60.

Table 2: **Primary and secondary endpoint analyses**



	De-escalation group	Control group	Difference in percentage points (two-sided 95% CI)
Age			
<80 years	117/124 (94%)	112/121 (93%)	1·8 (4·4 to 8·0)
≥80 years	31/32 (97%)	36/40 (90%)	6·9 (–4·9 to 18·7)
Acquisition type			
Community	82/85 (97%)	70/75 (93%)	3·1 (–3·6 to 9·9)
Non-community	66/71 (93%)	78/86 (91%)	2·3 (–6·4 to 10·9)
Severe sepsis or septic shock			
Yes	44/47 (94%)	31/34 (91%)	2·4 (–9·1 to 14·0)
No	104/109 (95%)	117/127 (92%)	3·3 (–3·0 to 9·5)
Source			
Urinary	59/60 (98%)	55/63 (87%)	11·0 (1·8 to 20·2)
Non-urinary	89/96 (93%)	93/98 (95%)	2·2 (–9·0 to 4·6)
Biliary	57/58 (98%)	61/64 (95%)	3·0 (–3·4 to 9·3)
Non-biliary	89/96 (93%)	86/96 (90%)	3·1 (–4·9 to 11·2)
Urinary or biliary	113/118 (96%)	122/126 (97%)	1·1 (–3·7 to 5·8)
Neither urinary or biliary	36/39 (92%)	33/33 (100%)	7·7 (7·7 to 7·7)
Bacteraemia caused by *Escherichia coli*			
Yes	95/100 (95%)	98/106 (93%)	2·5 (–4·1 to 9·2)
No	53/56 (95%)	50/55 (91%)	3·7 (5·9 to 13·4)

Data are shown for the modified intention-to-treat population. Eight patients in the de-escalation group and six in the control group were excluded for missing the assessment at test of cure.

Table 3: **Subgroup analyses for clinical cure at test of cure**

López-Cortés, et al. Lancet 2024

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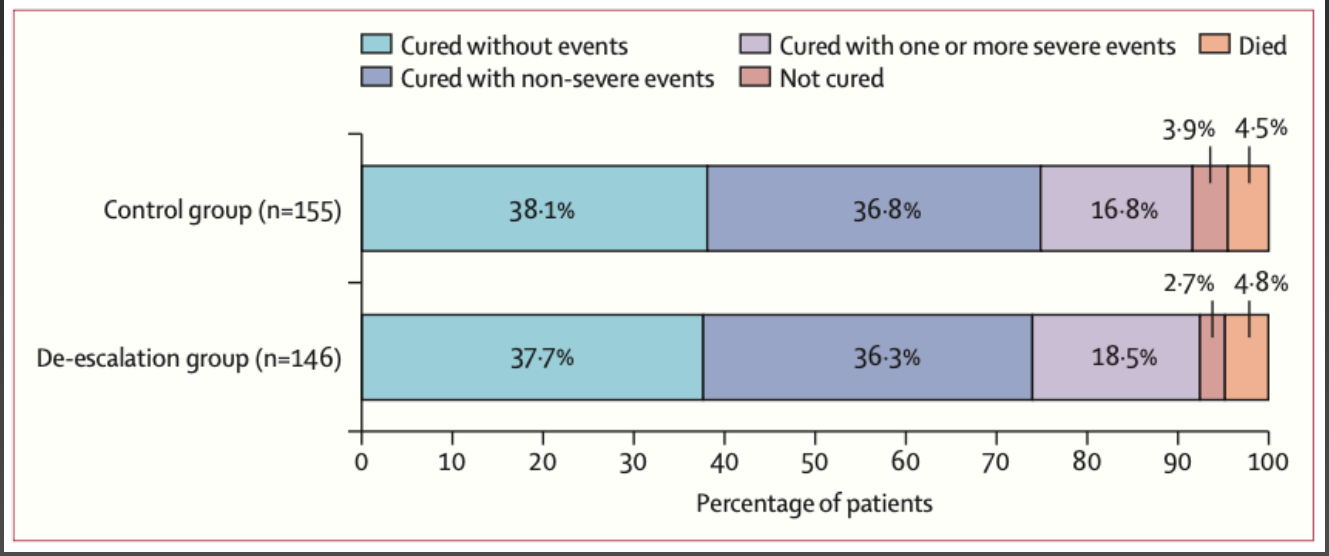

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Table 3: **Subgroup analyses for clinical cure at test of cure**

Structured de-escalation is non-inferior to continuing antipseudomonal β-lactams in patients with *Enterobacterales* BSI susceptible to narrower-spectrum agents

López-Cortés, et al. Lancet 2024

Principal components of strategies for stewardship and antimicrobial use in ICU

- Leadership commitment
  - Implementing antibiotic stewardship programs, infections control practices, communication between lab and clinical staff
  - Implement local resistance data for developing local antibiotic guidelines
- Multidisciplinary approach
  - A multidisciplinary team including infectious diseases specialists, microbiologists, pharmacist and nurses should be in charge of developing a specific antibiotic stewardship
  - Weekly round for MDR cases discussion
- **Implementation of modern antimicrobial use approach**
  - **Aggressive good quality microbiological sampling**
  - **Selection of empirical antimicrobials according to the clinical conditions, the presence of risk factors for resistant microorganisms and to the local epidemiology**
  - **Achievement of adequate pharmacokinetic / pharmacodynamic parameters of the antimicrobial agents used (extended/continuous infusion, TDM)**
  - **Systematic de-escalation**
  - **Short duration**

Bassetti M et al. Intensive Care Med 2015;41:776-795.

Conclusions

- Empirical broad-spectrum therapy should be guided by the **severity of clinical presentation**
- Toward **personalized antimicrobial selection**, based on **individual risk factors** such as **MDR colonization**
- Once initiated, the goal should be **rapid de-escalation** to **targeted therapy**
- **Rapid diagnostic tests** facilitate early effective therapy and rapid de-escalation
- **Empirical antifungal therapy and diagnostic-driven approaches have limited** evidence in **critically ill patients**

See you in Genoa on October 2026

Register at

www.htide.net

Perchè così tante infezioni ospedaliere?

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Vulnerabilità dell'ospite

Persone sane non vanno in ospedale!!!!

- Diminuzione generale della salute
- Minor mobilità
- Rottura delle difese primarie
  - ferite
  - invasività strumenti
- Aumento uso antibiotici
- Aumentata immunodepressione
- Sovra-rappresentazione di categorie a rischio (Bambini, anziani, diabetici)

Trasmissione di infezione

Diretta

- da paziente a paziente
- da staff a paziente

Indiretta

Reservoir

Ospite intermedio

Staff come vettori

Strumentazione

Paziente

Reservoirs (source of organism)

- Exogenous
  - other patients
  - staff
  - carriers
  - normal flora
  - environment
- Endogenous - patients own normal flora

Effect of hospitalisation on normal flora

changes **increased contact** **antibiotics**

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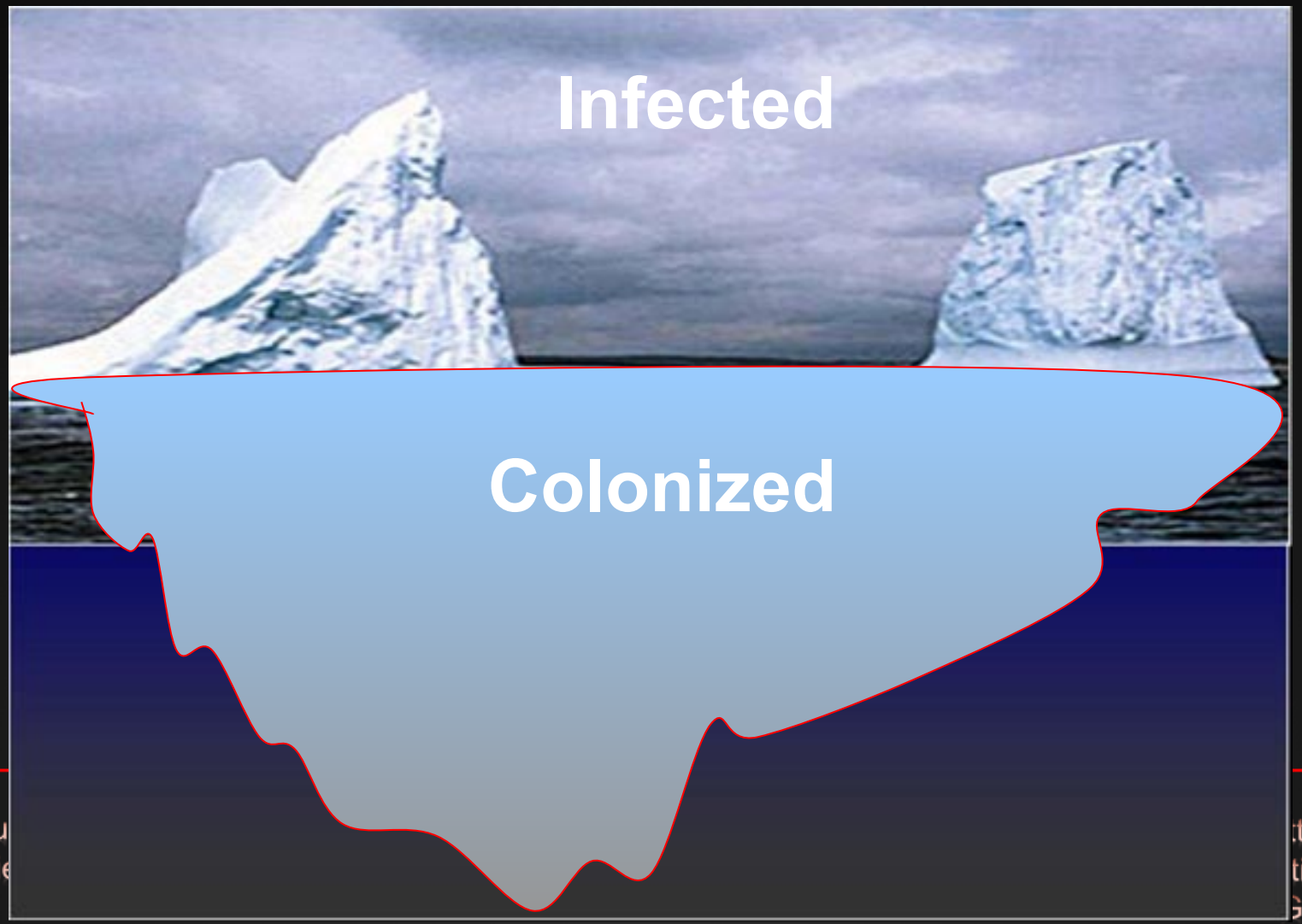
The Iceberg Effect



MDR bacteria are everywhere!

Prevent Person to Person Transmission

- Health Care Facility:
  - Use standard infection control precautions
  - Follow airborne, droplet and contact precautions
  - When in doubt, consult infection control experts
- Community Setting
  - Stay home when you are sick
  - Keep your hands clean
  - Set an example

1st principle of infection prevention

at least 35-50% of all healthcare-associated infections are associated with only 5 patient care practices:

- Use and care of urinary catheters
- Use and care of vascular access lines
- Therapy and support of pulmonary functions
- Surveillance of surgical procedures
- **Hand hygiene and standard precautions**

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If healthcare-associated bugs would look like this -
compliance with hand hygiene would be 100%!!!

Prevenzione

1. **Igiene delle mani**
2. **Sanificazione degli ambienti**
3. **DPI**: guanti, mascherine, calzari
4. **Gestione ottimale dei dispositivi** (CVC, CV): inserzione antisettica, manutenzione appropriata, rimozione tempestiva
5. **Antimicrobial stewardship**

Cosa implementare

1. **Educazione del personale sanitario:** igiene delle mani frequente, corretto utilizzo di DPI e dei dispositivi sanitari
2. **Conoscenza dell'epidemiologia locale:** antimicrobial stewardship
3. **Regolare ed efficace sanificazione degli ambienti**: prodotti che non inducano sviluppo di cross-resistenze con antibiotici (es metodi di sanificazione basati sull'utilizzo di probiotici, PCHS)

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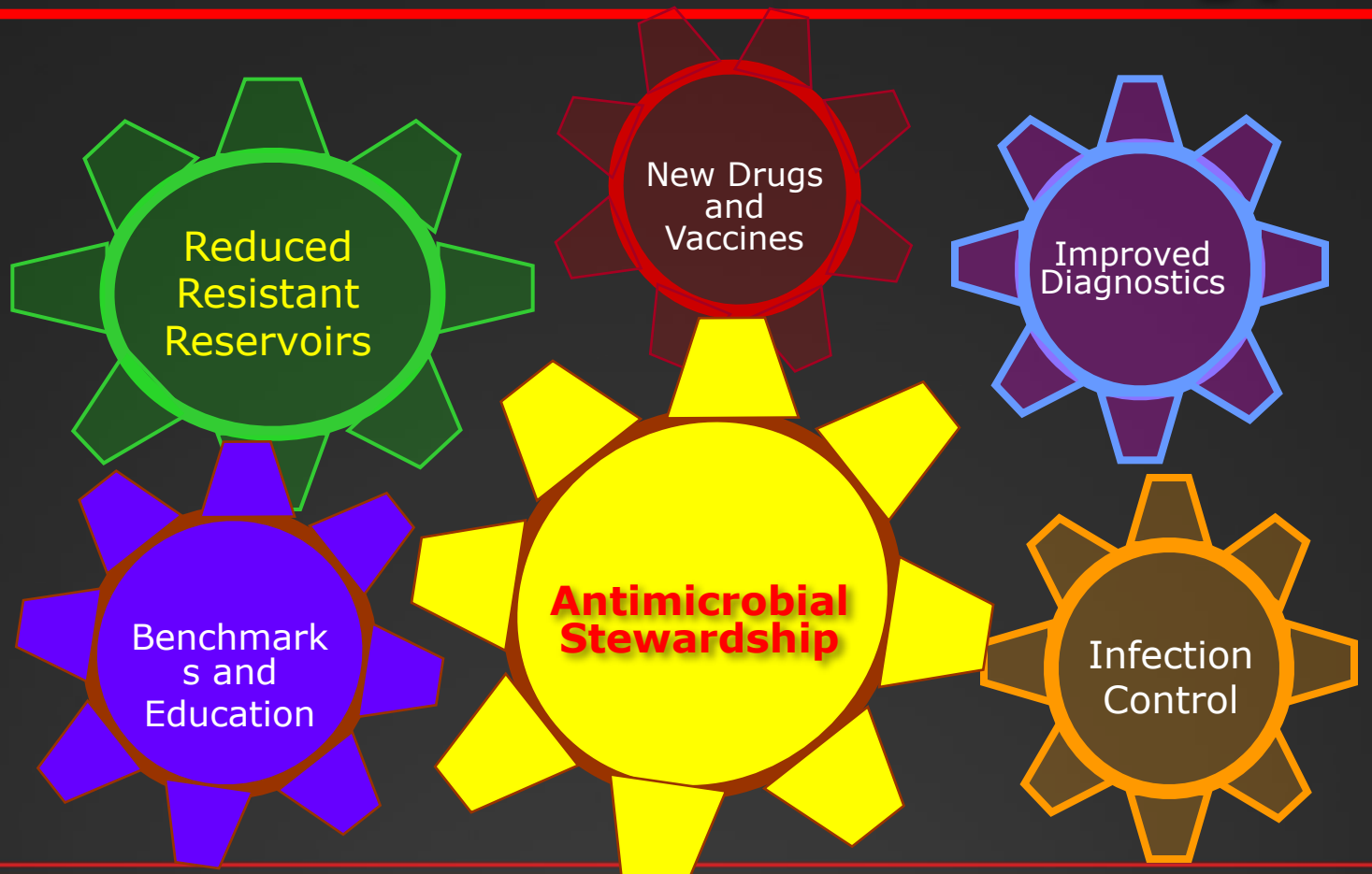
Bini, F. *et al. BMC Genomics* **26**, 382 (2025).

Antibiotic Stewardship: A Multi-Factorial Strategy



Adapted from Fishman N. *Am J Infect Control.* 2006;34:S55-S64.

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Evolution of the ID Clinician's Role

ID Clinician and Consultant

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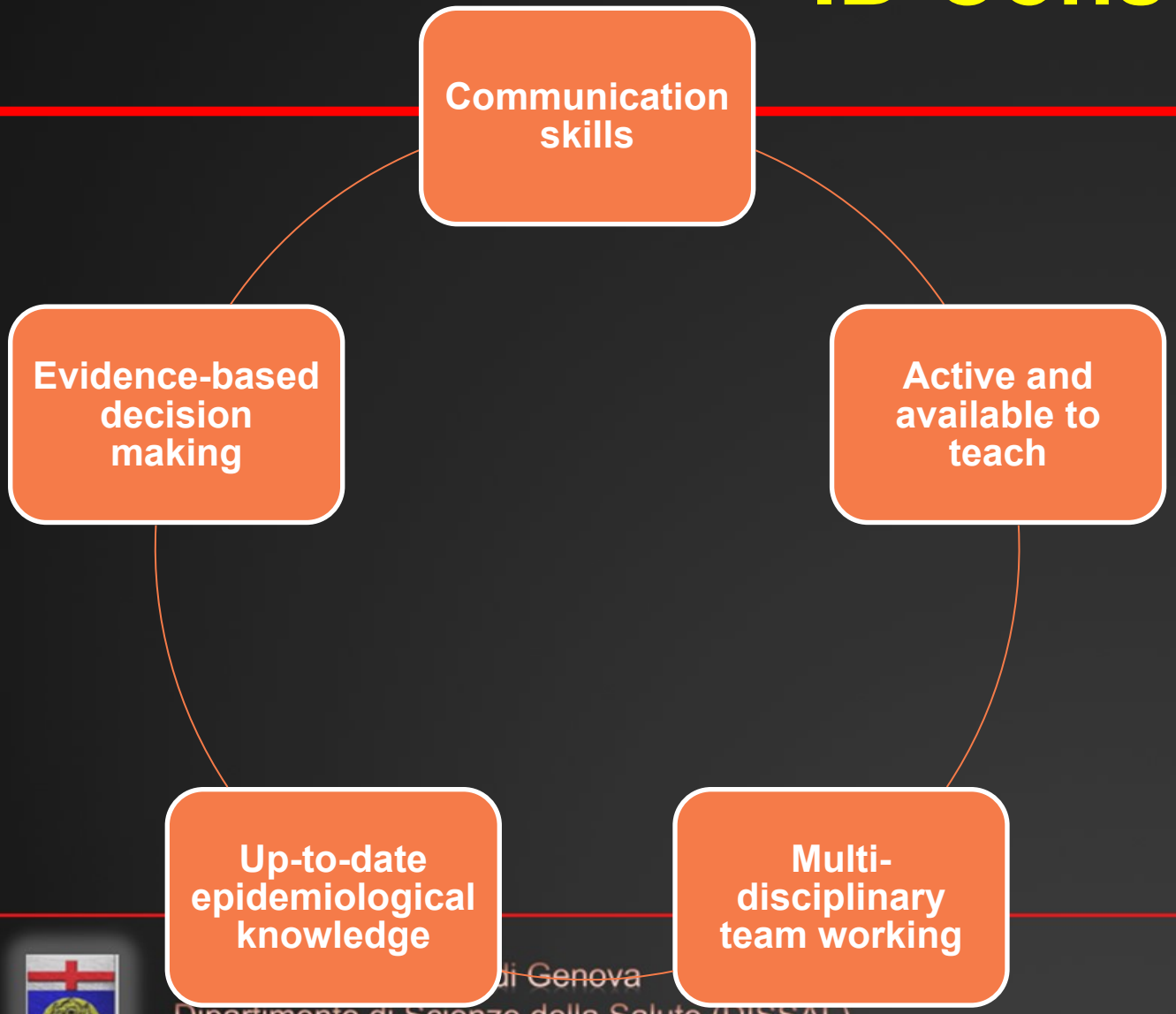
ID Consultant



Clinical Infectious Diseases
VIEWPOINTS
IDSA
OXFORD

H.U.S.T.L.E: A Consult Fitness Guide for Infectious Diseases Providers

Gonzalo Bearman[1,©] and Priya Nori[2,©]

Being a good ID physician today means not only delivering high-quality clinical care, but also **strategically managing time, requests, and priorities to work efficiently and maximize impact**

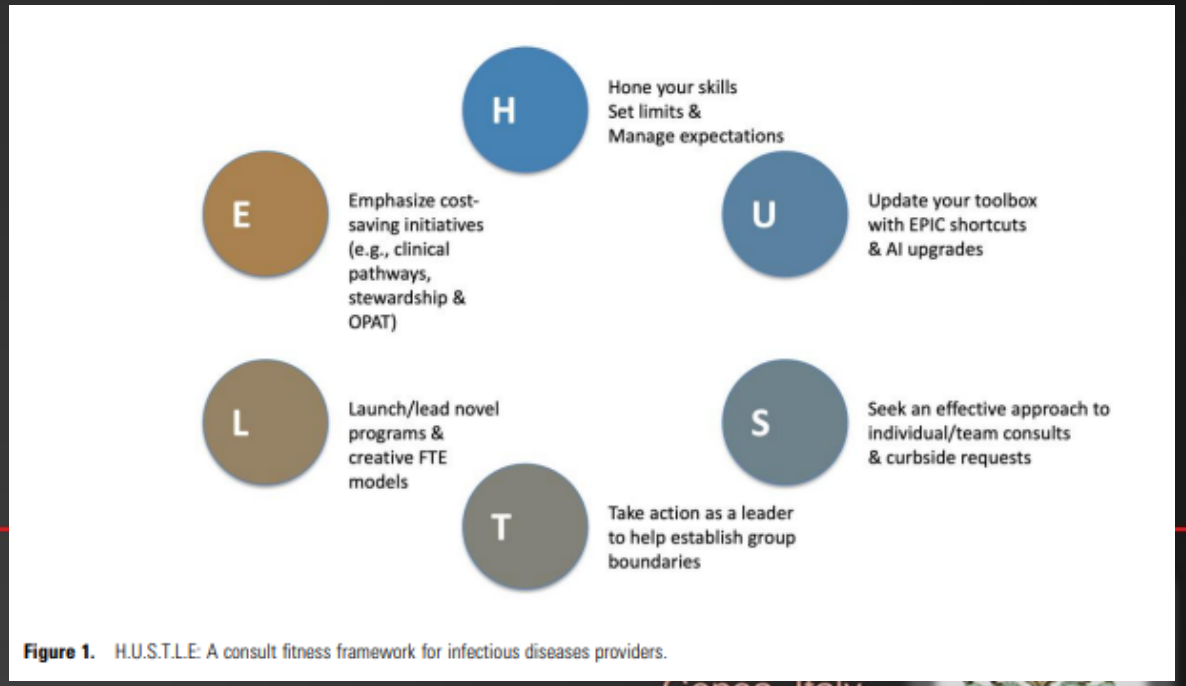


Figure 1. H.U.S.T.L.E: A consult fitness framework for infectious diseases providers.

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Petrak, et al. The Art and Science of Infectious Disease Consultation. Priv. Pract. Infect. Dis., 2025

Genoa, Italy

Bearman et al, CID. 2025

ID Consultation Impact

Effect of infectious disease consultation on mortality and treatment of patients with candida bloodstream infections: a retrospective, cohort study

Carlos Mejia-Chew, Jane A O'Halloran, Margaret A Olsen, Dustin Stwalley, Ryan Kronen, Charlotte Lin, Ana S Salazar, Lindsey Larson, Kevin Hsueh, William G Powderly, Andrej Spec

- ✓ **Lower 90-day mortality**
- ✓ **Improved management**: appropriate AFT, source control, adherence to recommended diagnostic evaluations

- ✓ **Reduced mortality through improved management and appropriate antibiotic use**

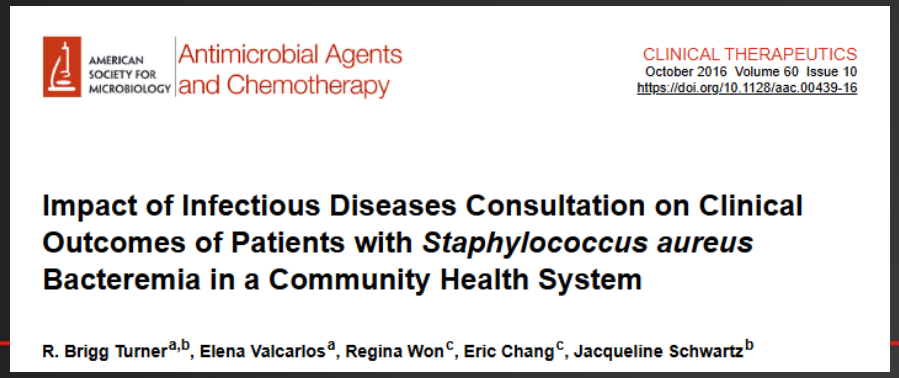
Open Forum Infectious Diseases

MAJOR ARTICLE

IDSA Infectious Diseases Society of America · hivma hiv medicine association · OXFORD

Impact of Infectious Diseases Consultation on the Outcome of Patients With Enterococcal Bacteremia: A Systematic Literature Review and Meta-analysis

Joseph Tholany,[1,0] Takaaki Kobayashi,[1] Alexandre R. Marra,[1,2,3] Marin L. Schweizer,[1,2] Riley J. Samuelson,[4] and Hiroyuki Suzuki[1,2]



AMERICAN SOCIETY FOR MICROBIOLOGY | Antimicrobial Agents and Chemotherapy

CLINICAL THERAPEUTICS
October 2016 Volume 60 Issue 10
https://doi.org/10.1128/aac.00439-16

Impact of Infectious Diseases Consultation on Clinical Outcomes of Patients with *Staphylococcus aureus* Bacteremia in a Community Health System

R. Brigg Turner[a,b], Elena Valcarlos[a], Regina Won[c], Eric Chang[c], Jacqueline Schwartz[b]

- ✓ **Lower treatment failure**, including lower mortality and recurrence rates
- ✓ **Improved adherence to quality-of-care indicators**, even in resource-limited hospitals

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Mejia-Chewt al. The Lancet. Infe dis 2019
Tholany, OFID 2022
Turner et al AAC. 2016

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CM vs ID specialty training

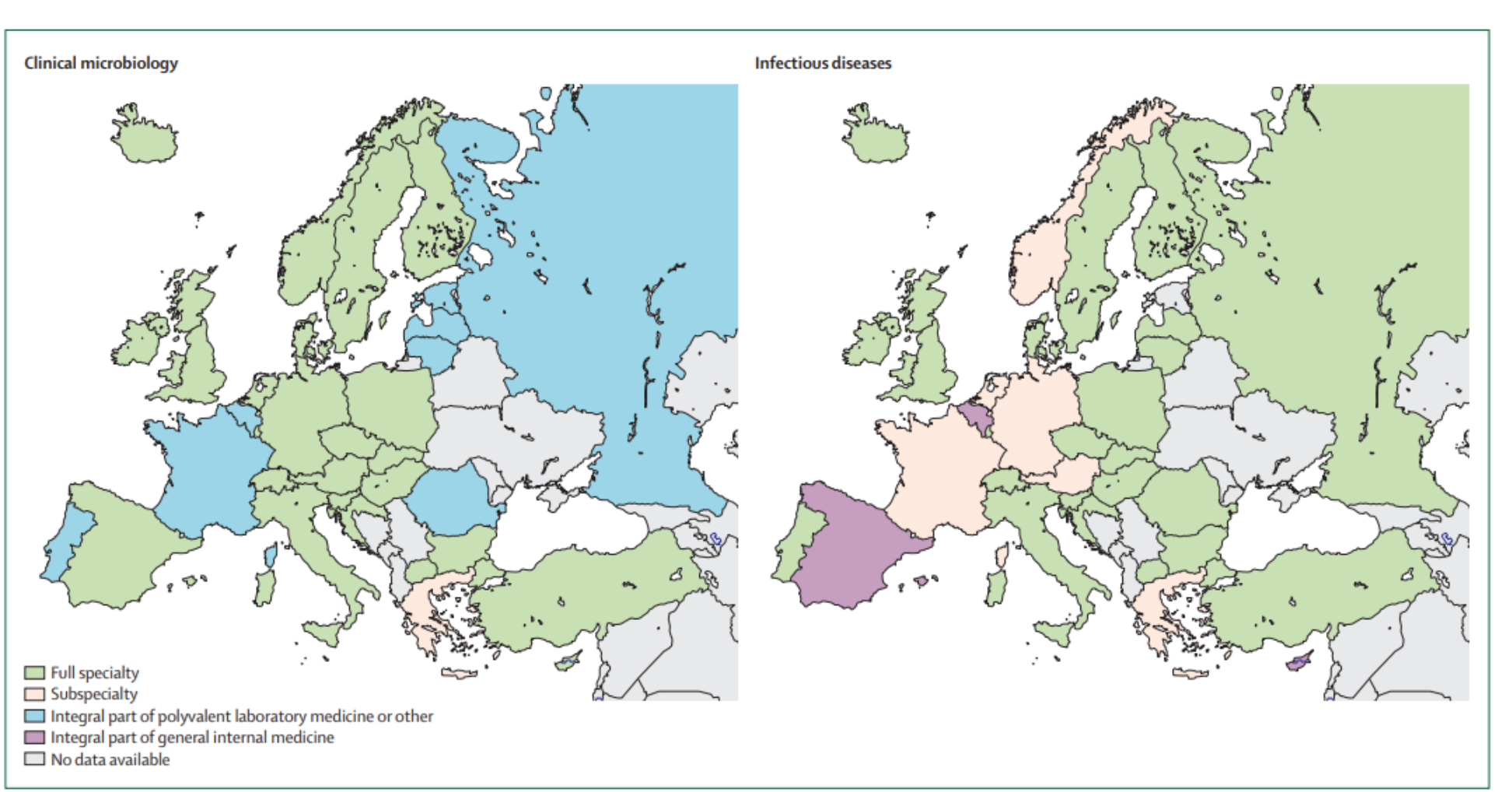

Figure: **Recognition of clinical microbiology and infectious disease specialties by the European Union**

Read, et al. 2011 "Professional challenges and opportunities in clinical microbiology and infectious diseases in Europe." The Lancet. Infectious diseases

We need STANDARDS!

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MAJOR ARTICLE

IDSA Infectious Diseases Society of America · hivma hiv medicine association · OXFORD

Curriculum and Competency Guidelines for the Advanced Care Practitioner in Infectious Disease

Miriam A. Smith,[1,2,©] Paul Zelenetz,[1,2] Angela Kim,[1,2] Henry Donaghy,[1,2] J. Scott Gould,[3] and Renee McLeod-Sordjan[3]

[1]Daytonand Karen Brown Division of Infectious Diseases, Donald and Barbara Zucker School of Medicine at Hofstra/Northwell, Manhasset, New York, USA, [2]Department of Medicine, Donald and Barbara Zucker School of Medicine at Hofstra/Northwell, Manhasset, NewYork, USA, and [3]Hofstra/Northwell School of Nursing and Physician Assistant Studies, 160 Hofstra University, Hempstead, NewYork, USA

Competency-based ID training → **Advanced care practice** → **Standardized curriculum** → **Evaluation**

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Smith et al, OFID 2023

Role of ID clinician, today

- Combatting AMR
- Leading AMS programs
- Strengthening infection prevention and control
- Managing emerging IDs

- Addressing misinformation
- Contributing to public health policy and preparedness
- Integrating One Health approach
- Teaching to new generations

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Personal opinion