

Mikrobna odpornost in vloga infektologa

Prof. dr. Bojana Beović, dr. med.

Univerza v Ljubljani
Medicinska fakulteta



univerzitetni klinični center ljubljana
University Medical Centre Ljubljana



ESCMID
AMS
Certificate

Mikrobna odpornost in vloga infektologa: nadzorovana raba antibiotikov

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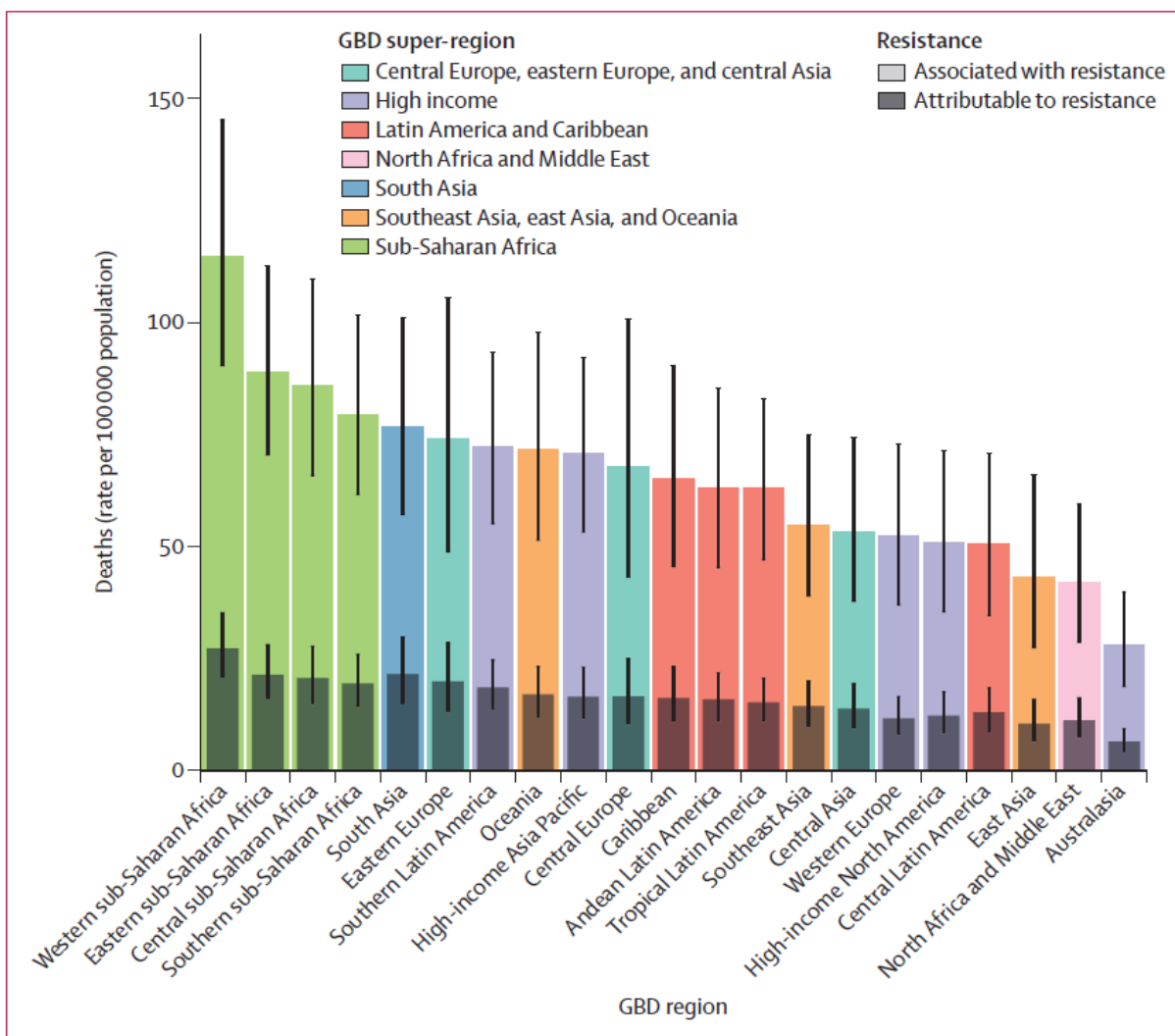


Figure 2: All-age rate of deaths attributable to and associated with bacterial antimicrobial resistance by GBD region, 2019

Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis

Antimicrobial Resistance Collaborators*

Lancet 2022; 399: 629–55

4·95 milijonov (3·62–6·57) smrti povezanih z AMR
1·27 milijonov (0·911–1·71) smrti neposredno pripisanih AMR



Embracing a One Health Framework to Fight Antimicrobial Resistance

OECD (2023), Embracing a One Health Framework to Fight Antimicrobial Resistance, OECD Health Policy Studies, OECD Publishing, Paris, <https://doi.org/10.1787/ce44c755-en>.



Average per year for the period 2020-50,* 34 countries included in the analysis

Interventions and packages	DALYs gained per year (per 100 000 population)	Health expenditure saved per year (per capita USD PPP)	Additional full-time workers per year (in thousands of workers), total	Return on investment (USD PPP)
Enhance farm biosecurity	897	0.001	1 414	1.0
Improve PVV23 coverage	2 927	0.033	1 316	2.4
Enhance food handling practices	3 096	0.004	4 427	5.2
Financial incentives	33 264	0.617	15 255	0.5
Improve prescriber education and training	40 021	0.688	17 066	4.5
Mass media campaigns	42 598	0.771	19 321	2.8
Improve hand hygiene	78 153	1.054	26 843	24.6
Enhance environmental hygiene	83 030	1.206	29 213	5.0
Scale up the use of RDTs	133 648	2.484	54 299	4.0
Delayed prescription	141 488	2.642	57 311	17.2
Strengthen antimicrobial stewardship	178 894	2.854	66 580	2.3
Community-based package	308 780	2.241	129 912	2.5
Mixed package	556 795	5.913	222 916	5.0
Hospital-based package	618 875	7.871	242 694	4.7

Datoteka Uredi Pogled Zgodovina Zaznamki Orodja Pomoč

Stewardship | Definition of Ste X

← → ↻ 🏠 ⓘ https://www.merriam-webster.com/dictionary/stewardship

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 SINCE 1828

stewardship

DICTIONARY THESAURUS

stewardship noun

stew-ard-ship | \ 'stü-ərd-, ship ⓘ, 'styü-; 'st(y)ürd-\

Definition of *stewardship*

- 1 : the office, duties, and obligations of a steward
- 2 : the conducting, supervising, or managing of something
especially : the careful and responsible management of something entrusted to one's care
// *stewardship* of natural resources

↓ Synonyms

WORD OF THE DAY

vox populi ⓘ

21:21
2.3.2019

Datoteka Uredi Pogled Zgodovina Zaznamki Orodja Pomoč

Stewardship | Definition of Ste X

https://www.merriam-webster.com/dictionary/stewardship

Merriam-Webster SINCE 1828 stewardship

Antimicrobial/antibiotic
stewardship (AMS) ~
nadzorovana raba antibiotikov

stewardship
stew-ard-ship |
Definition of

1 : the office, duties, and obligations of a steward

2 : the conducting, supervising, or managing of something
especially : the careful and responsible management of something entrusted to one's care
// *stewardship of natural resources*

↓ Synonyms

WORD OF THE DAY
vox populi

21:21
2.3.2019

Zgodovina nadzorovane rabe antibiotikov

- 1996: prva objava (antibiotiki so dragoceni in neobnovljivi viri, zato jih je treba uporabljati takrat, ko so indicirani in ne po nepotrebnem)
- 1990 – 2000: širitev dejavnosti po svetu, ustanavljajo se programi v bolnišnicah, postopno se vključuje zunajbolnišnično zdravstvo in veterina
- 2007 – 2012: premik v razumevanju: AMS ni le pravo zdravilo za pravega bolnika v ustreznem odmerku in trajanju (ustrezno, optimalno...) ampak je treba uravnotežiti družbeno vlogo (prihodnje bolnike): **odgovorno predpisovanje**



A word cloud centered around the theme of antibiotic stewardship. The words are arranged in a roughly circular pattern, with some overlapping. The colors of the words include dark green, orange, yellow, and red. A horizontal red line is drawn across the middle of the cloud, passing through the word 'responsible'.

better
appropriate
adequate
responsible
good
antibiotics
rational
optimal
policy
stewardship
use
effective
antimicrobials
correct
prudent

Nadzorovana raba antibiotikov je...

*...skladen sklop ukrepov za spodbujanje
odgovorne rabe antibiotikov.*



Zakaj

Kaj

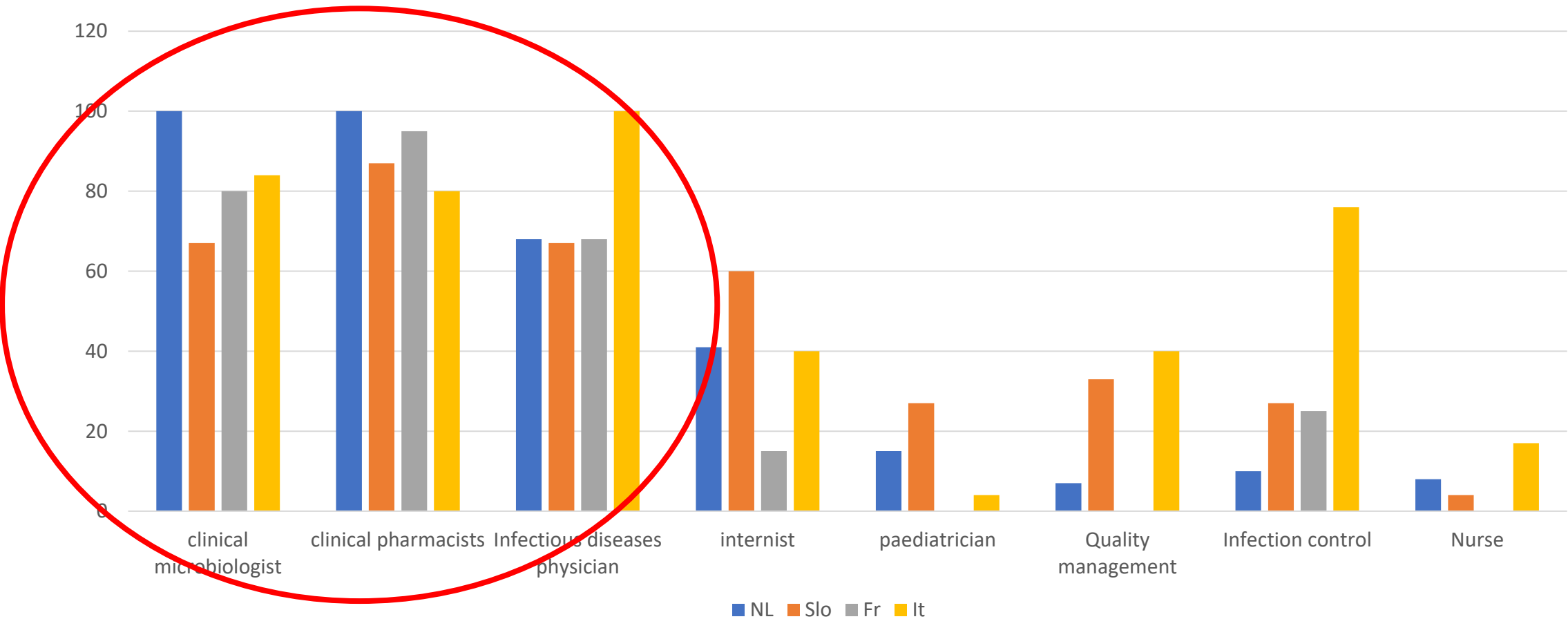
Kako

Kdo



Vloga infektologa?

Members of AMS Team in Four European Countries (% of hospitals)



Vpliv konzultacij infektologa na odgovorno rabo antibiotikov

Primernejša empirična in ciljno usmerjena obravnava

Prilagoditev zdravljenja

Manj zapletov

Nižja smrtnost

Krajša hospitalizacije

Krajše umetno predihavanje

Zgodnejša ukinitve zdravljenja.

Pogostejši prehod na peroralno zdravljenje

Nižji stroški

(dvomni rezultati nekaterih študij!)



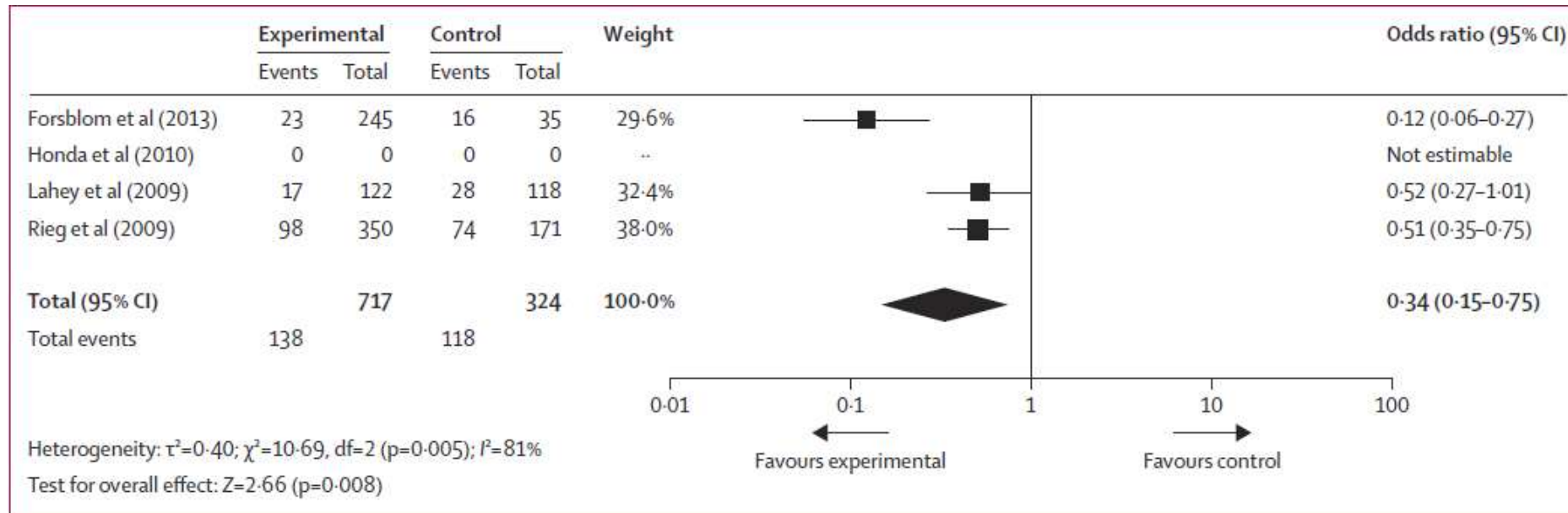
Znatno izboljšanje ustreznosti predpisovanja antibiotikov, zmanjšana poraba antibiotikov.

Različne prakse predpisovanja, posvetovanje mimogrede, vključevanje mlajših zdravnikov. Ni povezave med številom infektologov v državi in uporabo antibiotikov.

Uckay I, et al. J Infect 2009, Borer A, et al. Clin Microbiol Infect 2004; 10:911-16., Rainieri E, et al. Am J Infect Control 2008; 36: 283-90., Honda H, et al. Am J Med 2010; 123:631-7., Fluckiger U, et al. EJCMI 2000; 19:493-500., Byl B, et al. Clin Infect Dis 1999; 29: 60-6. Classen DC, et al. Clin Infect Dis 1997; 24:468-70., Chou AF, et al. Infect Control Hosp Epidemiol 2016;37:647-4., Fawcett NJK, et al. BMJ Open 2016;6:e010969., Pulcini C, et al. Clin Microbiol Infect 2014;20(10):963-72.

Current evidence on hospital antimicrobial stewardship objectives: a systematic review and meta-analysis

Emelie C Schuts, Marlies E J L Hulscher, Johan W Mouton, Cees M Verduin, James W T Cohen Stuart, Hans W P M Overdiek, Paul D van der Linden, Stephanie Natsch, Cees M P M Hertogh, Tom F W Wolfs, Jeroen A Schouten, Bart Jan Kullberg, Jan M Prins



Bedside consultations found as one of 6 successful interventions in antimicrobial stewardship.

(Vodilna) vloga zdravnika ID v multidisciplinarni skupini za nadzorovano rabo protimikrobnih zdravil

Celovito znanje o obvladovanju (diagnostiki in zdravljenju) okužb, veščine zdravljenja bolnikov ob postelji.

Povečano sprejemanje in s strani drugih zdravnikov.

Zmanjšano dojemanje, da je AMS shema za varčevanje.



Position paper

Developing core elements and checklist items for global hospital antimicrobial stewardship programmes: a consensus approach

C. Pulcini^{1,2,*}, F. Binda^{1,2,3}, A.S. Lamkang⁴, A. Trett⁴, E. Charani⁵, D.A. Goff⁶, S. Harbarth⁷, S.L. Hinrichsen⁸, G. Levy-Hara⁹, M. Mendelson¹⁰, D. Nathwani¹¹, R. Gunturu¹², S. Singh¹³, A. Srinivasan¹⁴, V. Thamlikitkul¹⁵, K. Thursky¹⁶, E. Vlieghe^{17,18,19}, H. Wertheim²⁰, M. Zeng²¹, S. Gandra⁴, R. Laxminarayan^{4,22}

¹¹ Université de Lorraine, APEMAC, Nancy, France

²¹ Université de Lorraine, CHRU-Nancy, Infectious Diseases Department, Nancy, France

³¹ University of Milan, Department of Biomedical and Clinical Sciences «Luigi Sacco», Milan, Italy

⁴¹ Center for Disease Dynamics, Economics & Policy (CDDEP), New Delhi, India

³¹ Imperial College London, Department of Medicine, NIHR Health Protection Research Unit in Healthcare Associated Infections and Antimicrobial

- Podpora vodstva bolnišnic
- Odgovornost in pristojnost
- Znanje o obvladovanju okužb
- Izobraževanje in praktično usposabljanje
- Drugi ukrepi za odgovorno uporabo protimikrobnih sredstev
- Spremljanje in nadzor (neprekinjeno)



Transatlantic Taskforce on Antimicrobial Resistance (TATFAR)

Report on the modified Delphi process for common structure and process indicators for hospital antimicrobial stewardship programs

*Authors: Lori A. Pollack, Diamantis Plachouras, Heidi Gruhler, Ronda Sinkowitz-Cochran
Senior Advisors: Dominique L. Monnet, J. Todd Weber*

April 10, 2015

- **Infrastruktura**
- **Ukrepi**
- **Nadzor in povratna informacija**

Zgodovina nadzorovane rabe antibiotikov v UKCL

Komisija za antibiotike

1977: (prim. dr. Pavle Kornhauser, dr. med.), prof. dr. Marica Marolt Gomišček, dr. med.

1991: prof. dr. Milan Čižman, dr. med.

2004: prof. dr. Bojana Beović, dr. med.

Leto	Ukrep
1976	Ustanovitev Komisije za antibiotike
1999	Seznam antibiotikov, ki potrebujejo odobritev infektologa*
	Seznam konziliarnih infektologov po oddelkih
2004	Ustanovitev enote za konziliarno in konzultantsko službo na KIBVS
	Kartončki za beleženje konziliarnih storitev
	Mesečno spremljanje porabe protimikrobnih zdravil do ravni stroškovnega mesta
2009	Redno letno spremljanje občutljivosti bakterij v UKC
2010	Omejitev predpisovanja cefalosporinov z izjemo 1. generacije
	Obnova obrazca za rezervne antibiotike
2012	Akcija – 20 %
	Analiza antibiotične kirurške profilakse po vseh kirurških oddelkih UKC
2014	Mreža konziliarnih infektologov na Pediatrični kliniki
	En konziliarni infektolog zadolžen samo za konziliarno službo (AMS)
2017	Januar: prospektivni pregled bolnikov z bakteriemijo S. aureus
	November: prospektivni pregled bolnikov s kandidemijo
	Dodatni konziliarni infektolog, po mesečnem razporedu zadolžen samo za konziliarno službo in AMS

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Antibiotične vizite

Leto	Ukrep
1999	Prisotnost infektologa dvakrat tedensko na raportu v KOOKIT
	Dnevne antibiotične vizite na KO za nevrokirurgijo
2005	Dvakrat tedensko antibiotične vizite na KO za abdominalno kirurgijo v UKC (ne BDP)
2016	Oktober: tedenske antibiotične vizite na KO za travmatologijo
	November: dvakrat tedensko antibiotične vizite na Oddelku za intenzivno terapijo kirurških strok in na KVK in na KOIIM
	KO za torakalno kirurgijo dvakrat tedensko
2018	Ortopedija
2022	vizite na nevrologiji vključno z ONIT enkrat tedensko (raven Klinike!)
	Nefrologija vizite
	KO za kirurške okužbe
2024	November: vizite na urologiji



Taylor & Francis Online

Home ► All Journals ► Journal of Chemotherapy ► List of Issues ► Volume 21, Issue 1 ► The Impact of Total Control of Antibiotic Prescribing by Infectious Disease Specialist on Antibiotic Consumption and Cost

Journal of Chemotherapy
Volume 21, 2009 - Issue 1

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Antimicrobial Chemotherapy

The Impact of Total Control of Antibiotic Prescribing by Infectious Disease Specialist on Antibiotic Consumption and Cost

B. Bevilacqua, S. Kreft, K. Serne & M. Özkan
Pages 46-51 | Published online: 18 Jul 2013

Download citation | <https://doi.org/10.1179/joc.2009.21.1.46>

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Updated 31 March 2023

► *Pediatr Infect Dis J.* 2016 Oct;35(10):1104-10. doi: 10.1097/INF.0000000000001245.

Handshake Stewardship: A Highly Effective Rounding-based Antimicrobial Optimization Service

Amanda L Hurst¹, Jason Child, Kelly Pearce, Claire Palmer, James K Todd, Sarah K Parker

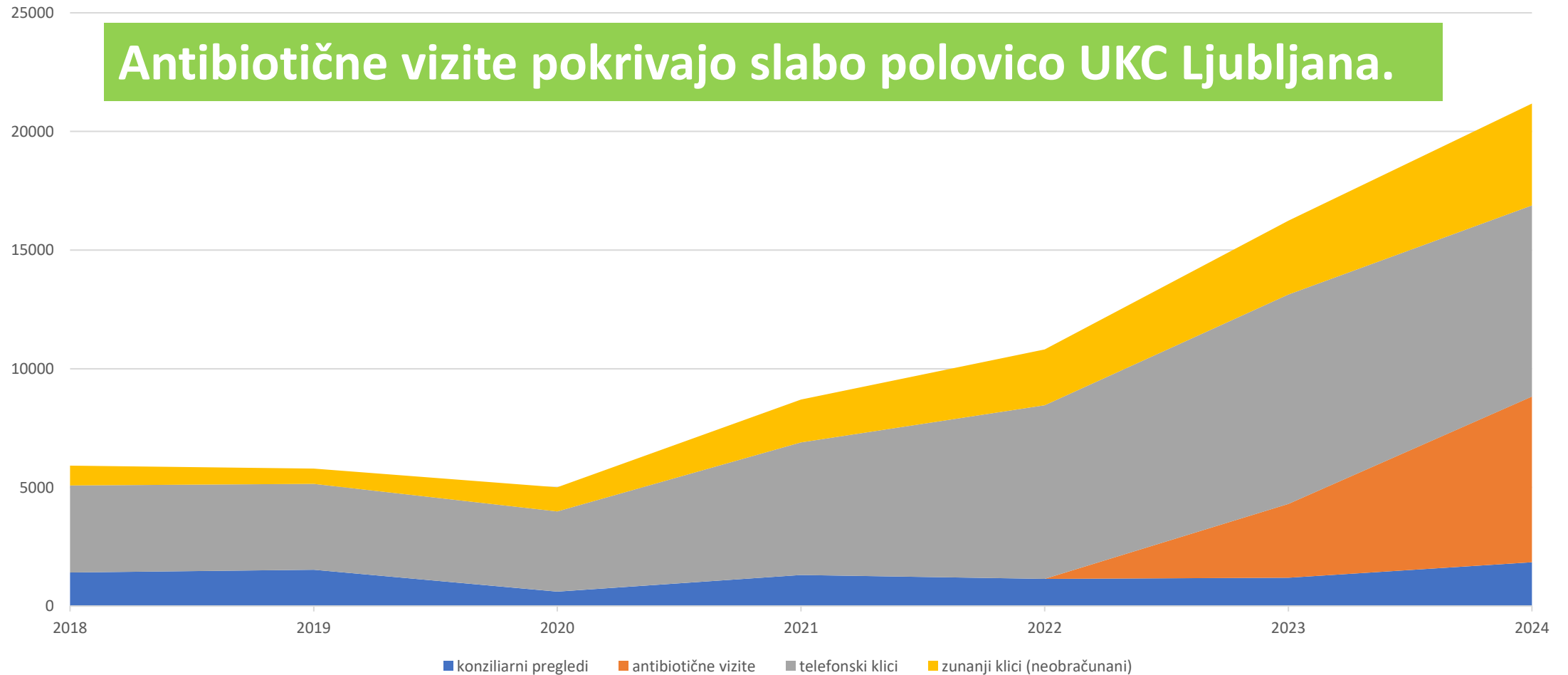
Affiliations + expand

PMID: 27254036 DOI: 10.1097/INF.0000000000001245

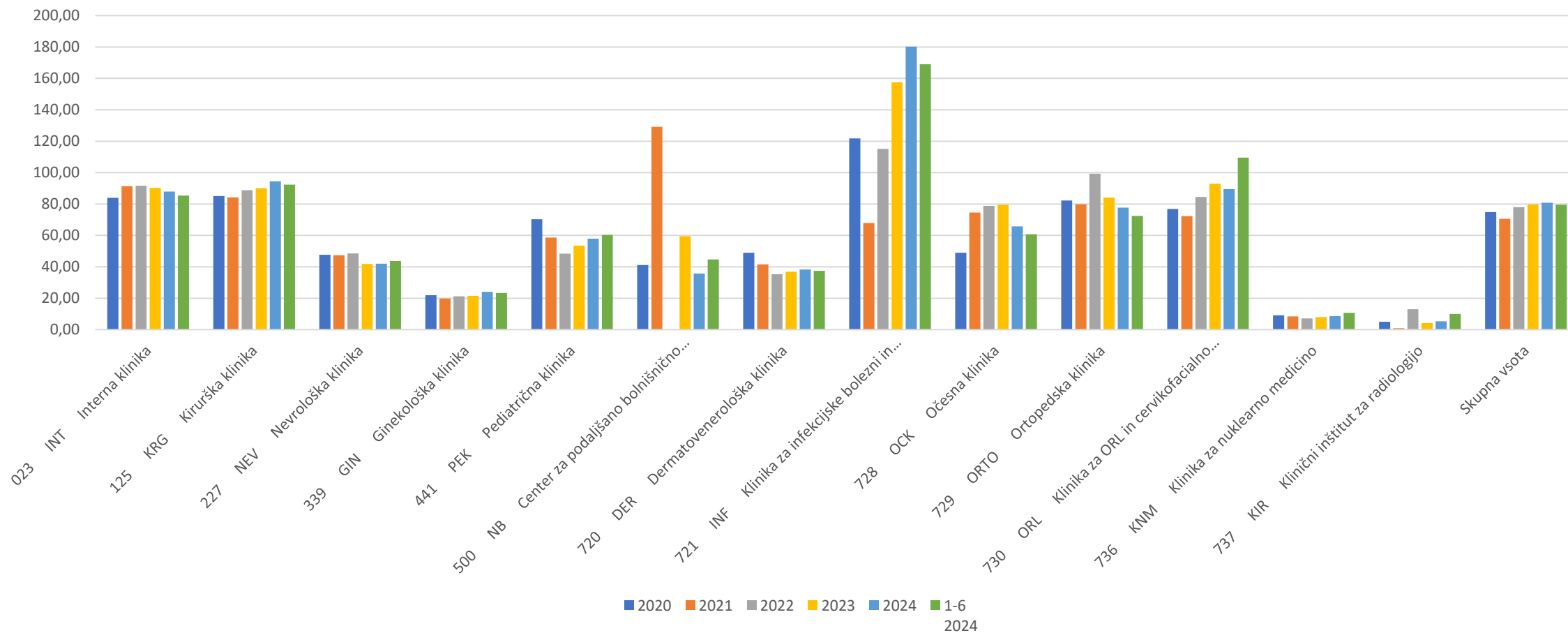
Information about (monkeypox)

Antibiotic rounds as a tool for antimicrobial stewardship

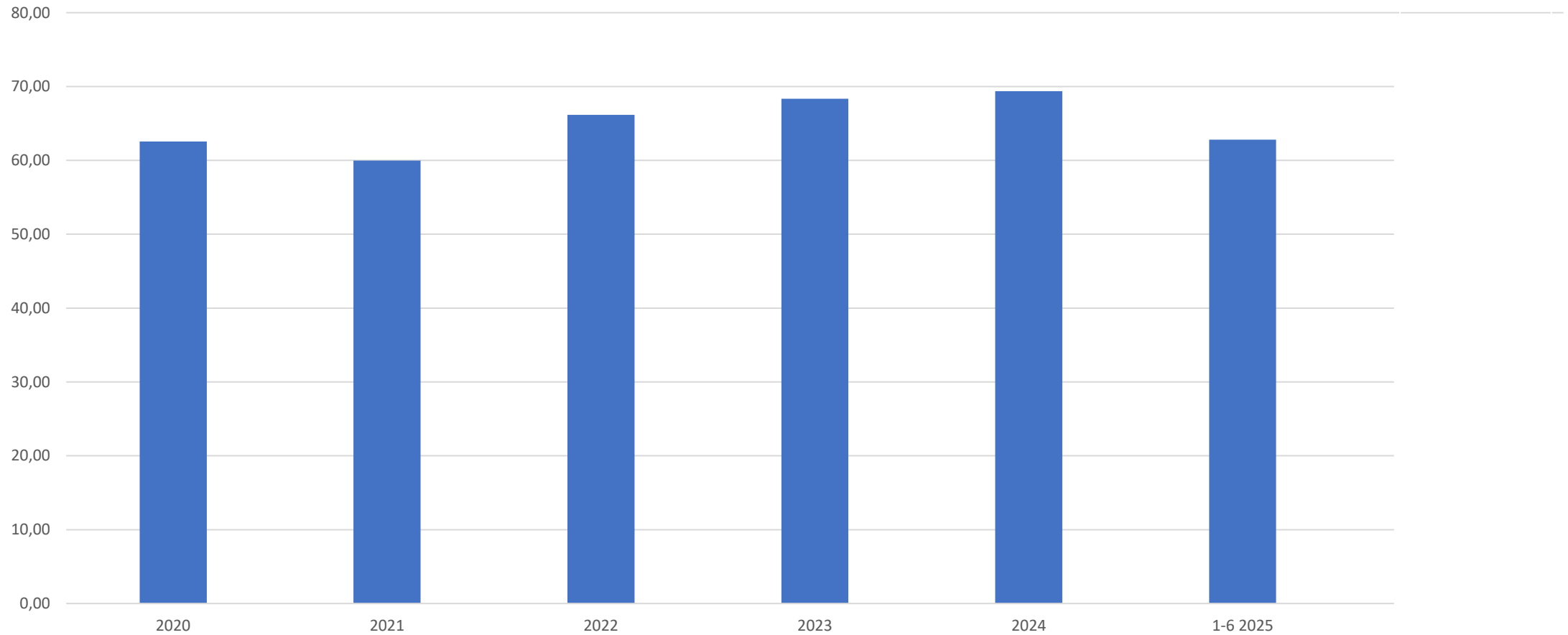
Obseg dela Enote



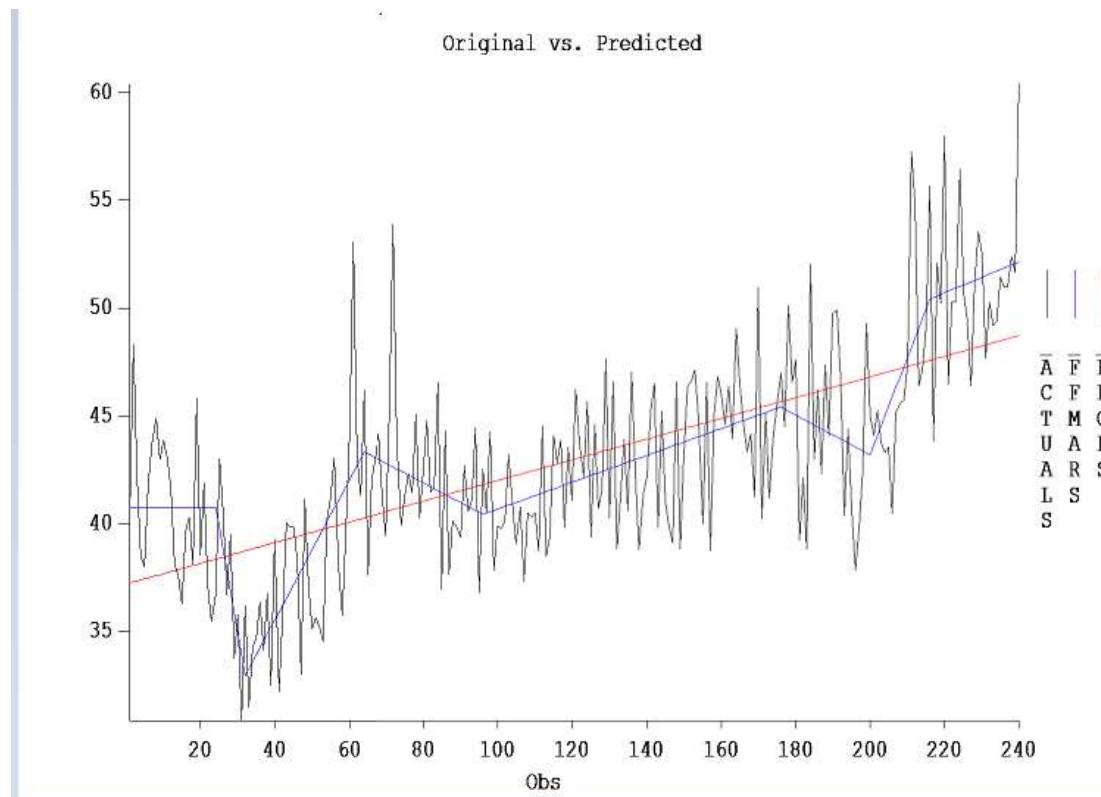
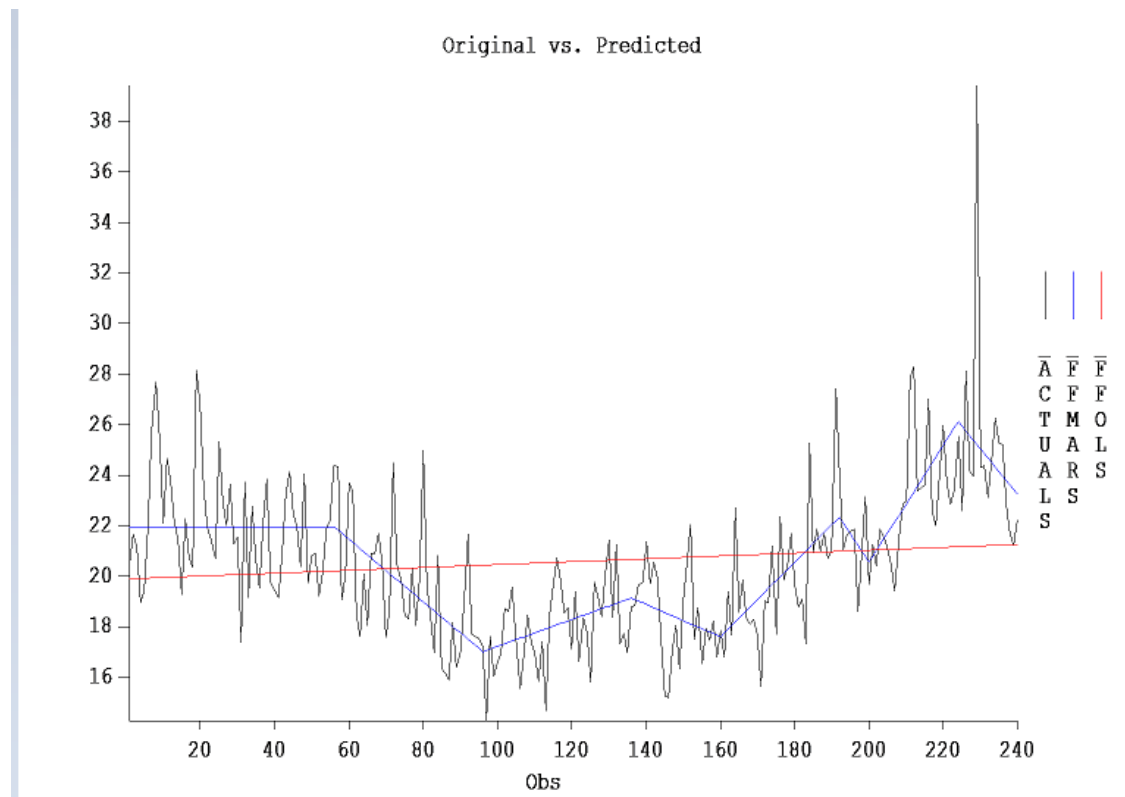
Poraba protimikrobnih zdravil v UKCL



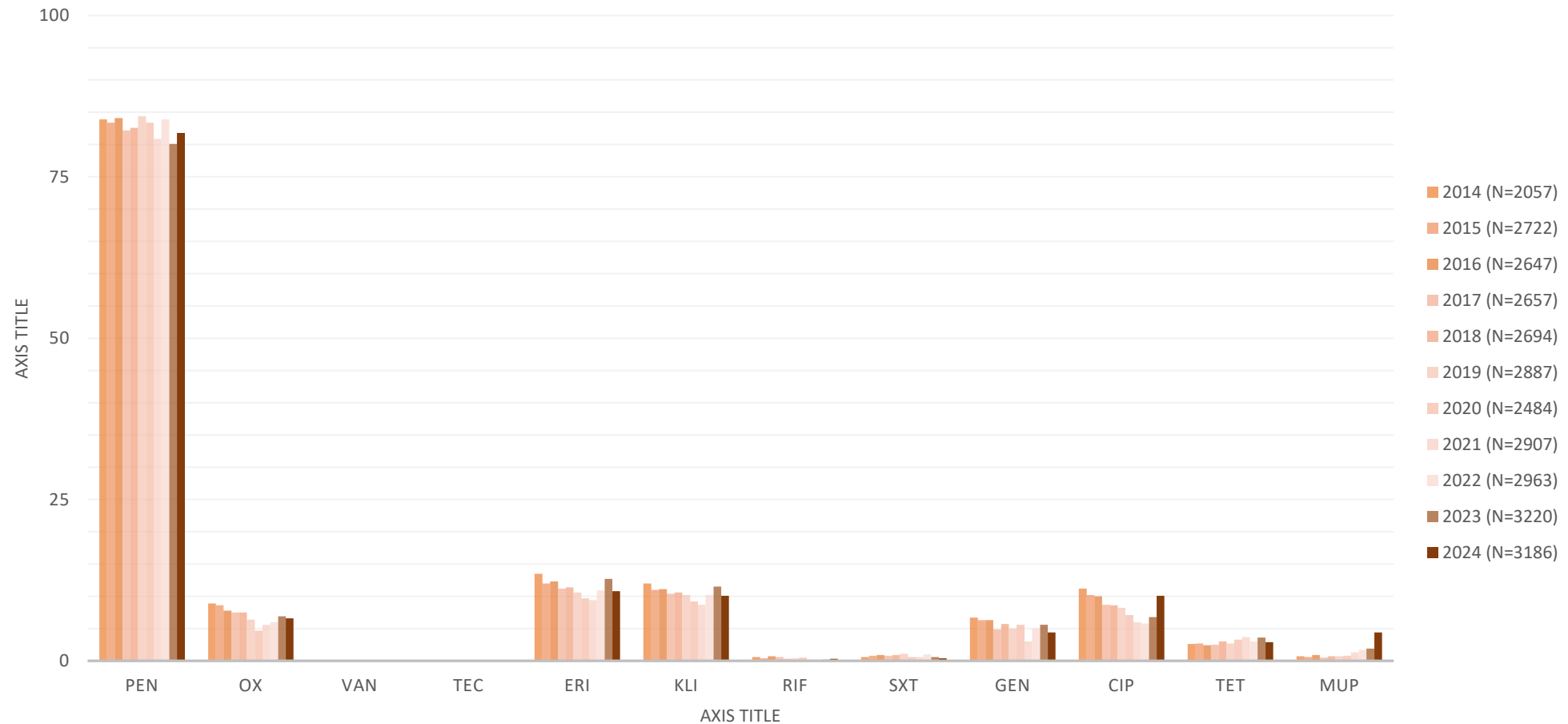
Poraba antibiotikov v UKCL 2020 – 2025 v DDD/100 BOD



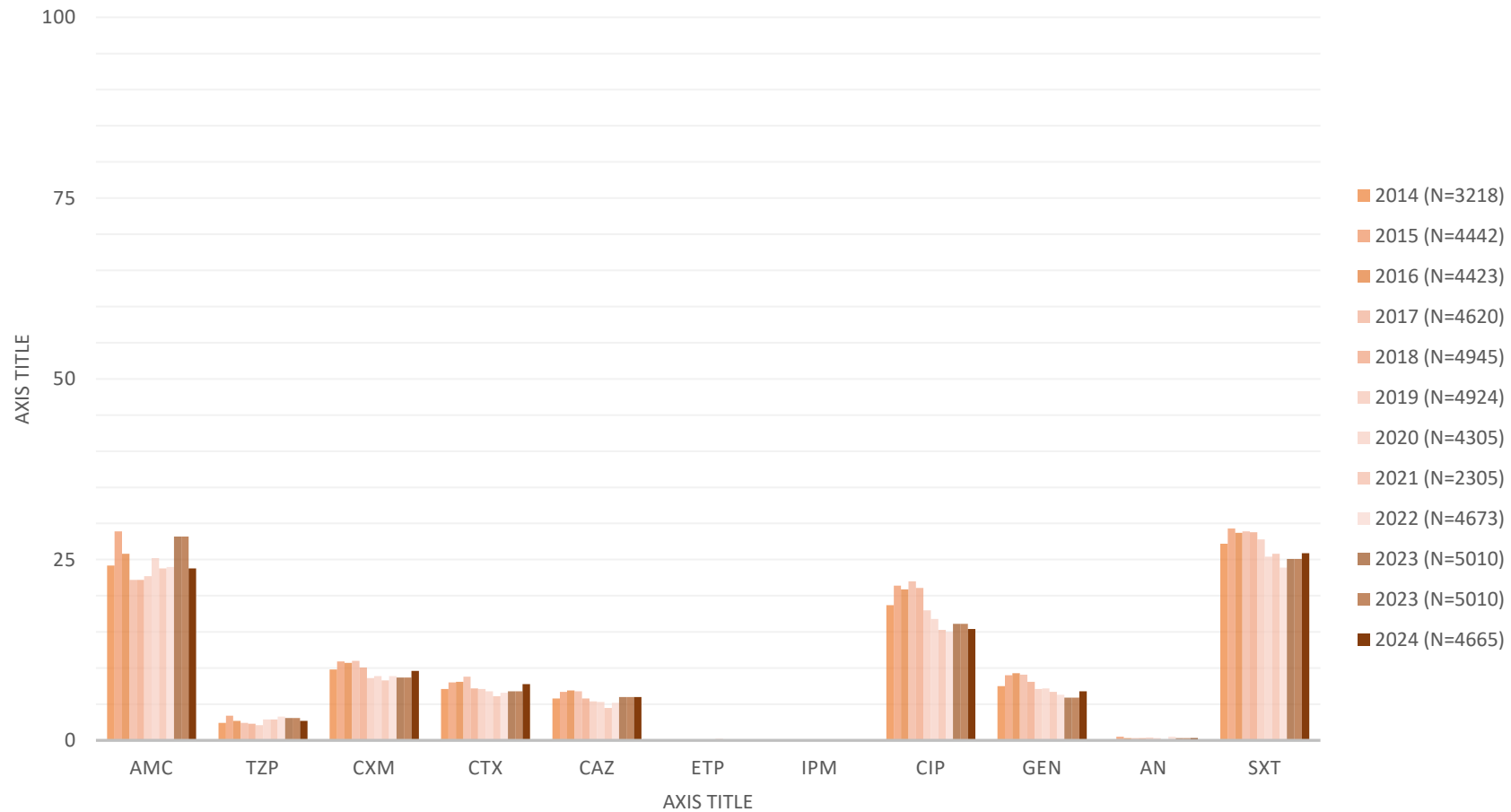
Antibiotiki z (levo) in brez omejitve predpisovanja 2004 - 2024



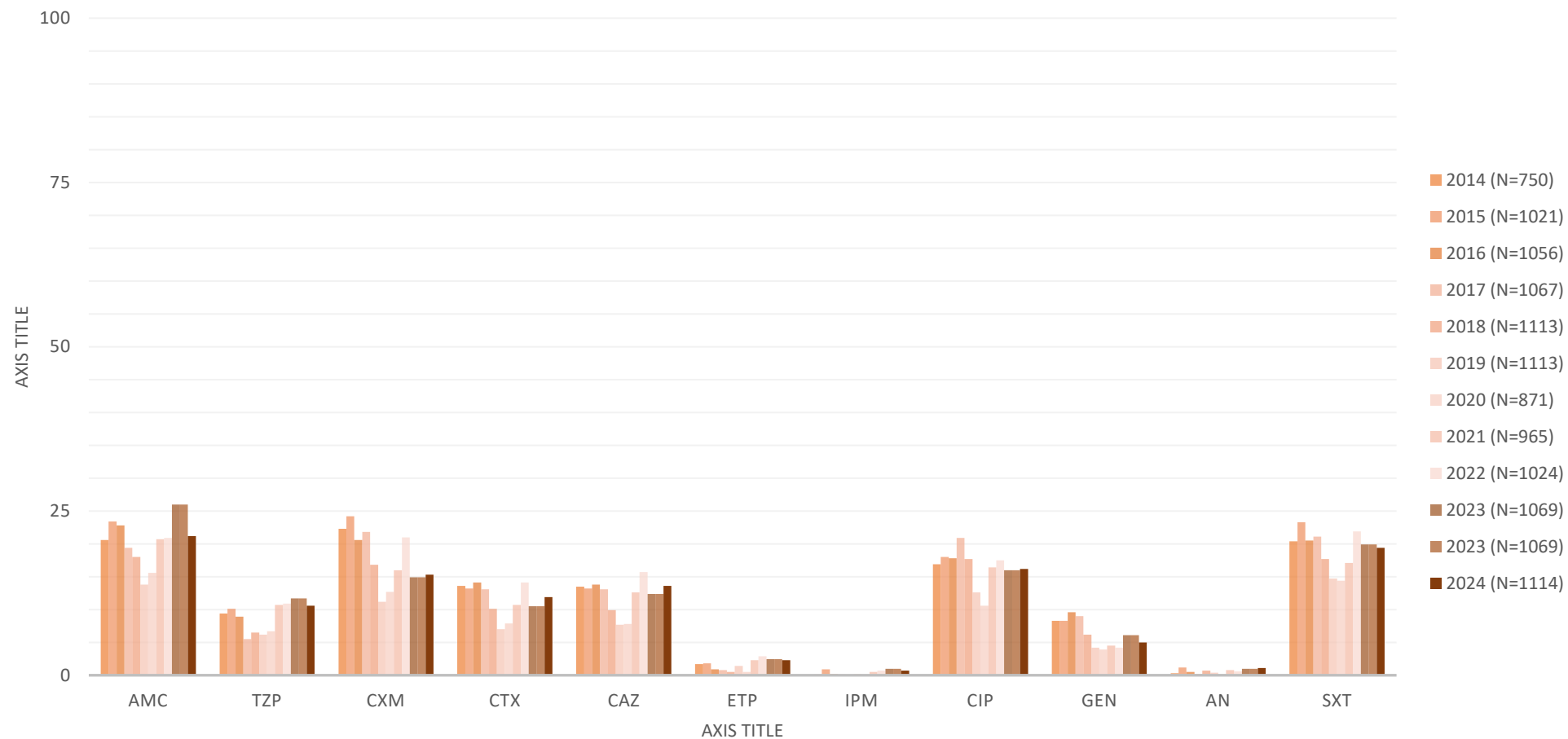
Odporni izolati bakterije *S. aureus* v UKCL



E. coli



K. pneumoniae



Nadzorovana raba protimikrobnih zdravil:
dejavnost UKCL za Slovenijo

Priporočila za predpisovanje antibiotikov

Prof. dr. Marica Marolt Gomišček in prof. dr. Jože Drinovec: Navodila za uporabo antibiotikov v bolnišnicah v 70. letih, objavljeno v Biltnu





QUIBA je aplikacija za smotrno predpisovanje protimikrobnih zdravil za zdravstvene



<https://www.quibaguide.com/Identity/Account/Login?returnUrl=%2>

Izobraževanja

Infektološki simpoziji od 1996

Podiplomski tečaji predpisovanja protimikrobnih zdravil ob 2010

Enodnevni tečaj za specializante iz urgentne medicine od 2024

Številna predavanja na izobraževalnih dogodkih drugih specialnosti



Nadzorovana raba protimikrobnih zdravil v UKC
Ljubljana:
doprinos v svetu



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Antimicrobial Stewardship Certificate

Antimicrobial Stewardship Certificate 2022–2024

Supra Senell,
Antimicrobial Stewardship
Certificate
Programme
Coordinator



Josiah Suleman,
Antimicrobial Stewardship
Certificate
Programme
Coordinator



Antimicrobials are the most important drivers of antimicrobial resistance, which are prescribed by virtually all physicians involved in direct patient care. The improvement of antimicrobial prescribing and the decrease in their use are essential for the control of antimicrobial resistance. Antimicrobial stewardship (AMS) has been developed as a set of interventions that aim to improve antimicrobial use. Over time, it has become apparent that the interventions should be undertaken by teams of specialised expert with dedicated time to carry out antimicrobial stewardship interventions and support antimicrobial prescribing at various levels of health care. Current curricula of postgraduate training for physicians, pharmacists and other professionals involved in AMS do not provide all the knowledge and skills that are needed for an expert involved in antimicrobial stewardship. Educational opportunities for experts in AMS worldwide are scarce and partial. In addition to the knowledge on aetiology and pathogenesis of infections, the knowledge on pharmacology of antimicrobial agents, as well as practical skills in infection management and specific AI interventions, an AMS expert should be familiar with surveillance of antimicrobial use and resistance, the position of AMS in healthcare structure, basic principles of infection prevention and control, and have an understanding of AMS as a part of quality management, behav-



58 international experts responded to a modeled Delphi technique survey

88

Consensus on 88 AMS competencies covering 15 domains



Alves et al, Establishing Core Competencies for Antimicrobial Stewardship Teams: A Consensus Development Using the Modified Delphi Technique: an ESCAP position paper. CMI. 2025



Hvala!

Mentorjema

- Prof. dr. Marici Marolt Gomišček, dr. med.
- Prof. dr. Milan Čižman, dr. med.

Dolgoletnemu predstojniku akad. prof. dr. Francu Strletu, dr. med.

- Za ustanovitev enote
- Za postopno širitev s stalno zaposlenimi na področju konziliarne

infektološke službe in AMS.

In seveda, vsem svojim številnim šefom in sodelavcem!



In
naprej?

- Strategija nadzorovane rabe antibiotikov 2025 – 2025 potrjena na Komisiji za antibiotike
- Enota za konziliarno službo in nadzorovano rabo antibiotikov se krepi!





Never give up on something
that you can't go a day
without thinking about.

Winston Churchill