

Antimikrobiyal Yönetimi

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Antibiyotik Kullanımı: İstenmeyen Sonuçlar

- Advers etkiler
- Morbidite ve mortalitenin artması
- Yatış süresinin uzaması
- Hastane masraflarının artması
- Sekonder infeksiyonlara yatkınlık
- Dirençli bakterilerin ortaya çıkması

Antibiyotik Kullanımı: Sorunların Başlangıcı

- 1940'lar ▶ Antibiyotiklerin kullanıma girmesi
▶ Sorunların başlaması
- 1950'ler ▶ Yeni ajanlar ▶ Gittikçe artan ve çoğu kez uygun olmayan kullanım
- 1956 Jawetz ▶ Antibiyotiklerin cazibesinden kaynaklanan sorunlar ▶ İlaç endüstrisi
 - Abartılı iddialar
 - Promosyonun muazzam etkisi

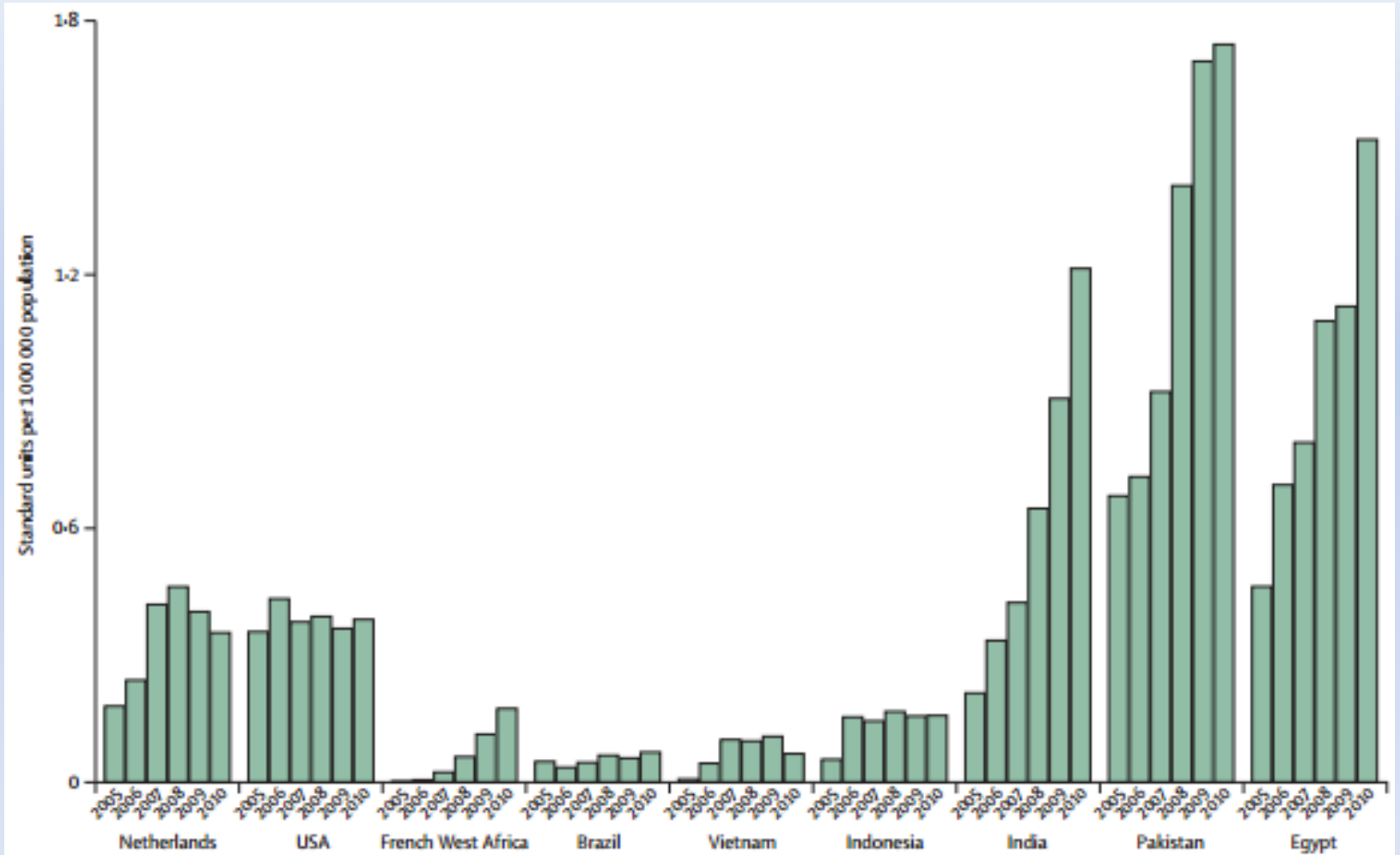
Uygun Olmayan Antibiyotik Kullanımı

- **Aşırı** kullanım
- **Yetersiz** kullanım
- **Kötü / yanlış** kullanım
- **Çirkin / kötüye** kullanım (suistimal)

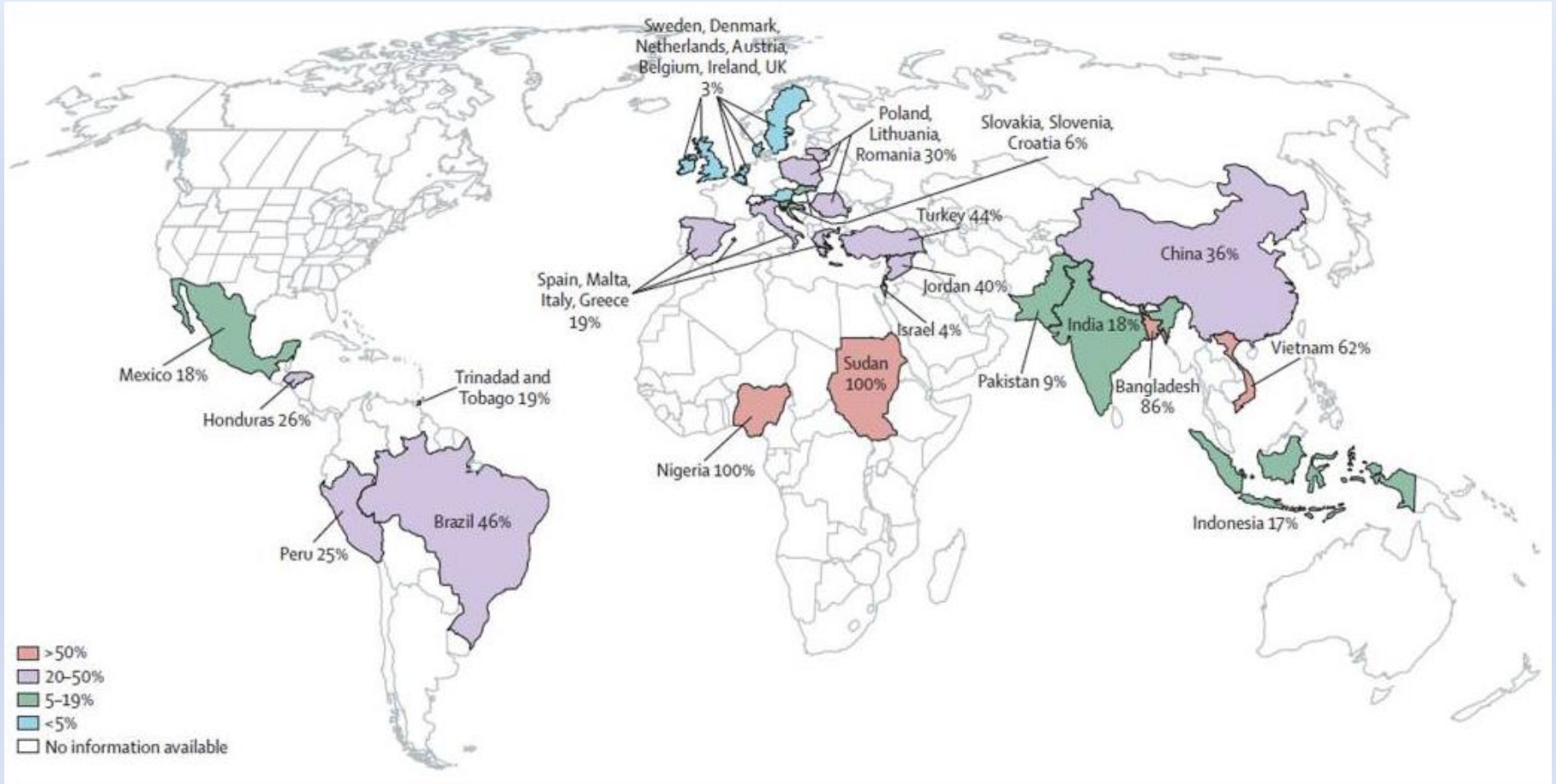
Table 1. Examples of inappropriate use of antibiotics.^{4,7}

Type	Example
Overuse	• Prescribing antibiotics for viral infections • Prescribing antibiotics for non-infectious processes (eg febrile patient with pancreatitis) • Treating minor bacterial infections that do not require antibiotics (eg small skin abscesses that resolve with incision and drainage) • Treating bacterial colonisation (eg positive catheter urine culture from an asymptomatic older patient) • Prescribing prolonged treatment courses (eg >24 hours for low-risk surgical prophylaxis)
Misuse	• Use of broad-spectrum antibiotics effective against multidrug-resistant organisms in a patient with a community-acquired infection • Failure to de-escalate broad-spectrum antibiotics according to culture results • Failure to adjust antibiotic prescription according to culture results when the isolated organism is resistant to initial therapy
Underuse	• Inadequate dosing of antibiotics • Premature discontinuation of antibiotics • Delay to prompt treatment of severe sepsis • Failure to prescribe an antibiotic regimen with an adequate spectrum of activity in a patient with a life-threatening infection
Abuse	• Prescribing antibiotics for financial incentive • Prescribing particular antibiotics as a result of pressure from a pharmaceutical industry representative

Karbapenem Antibiyotiklerin Perakende Satış Eğilimleri

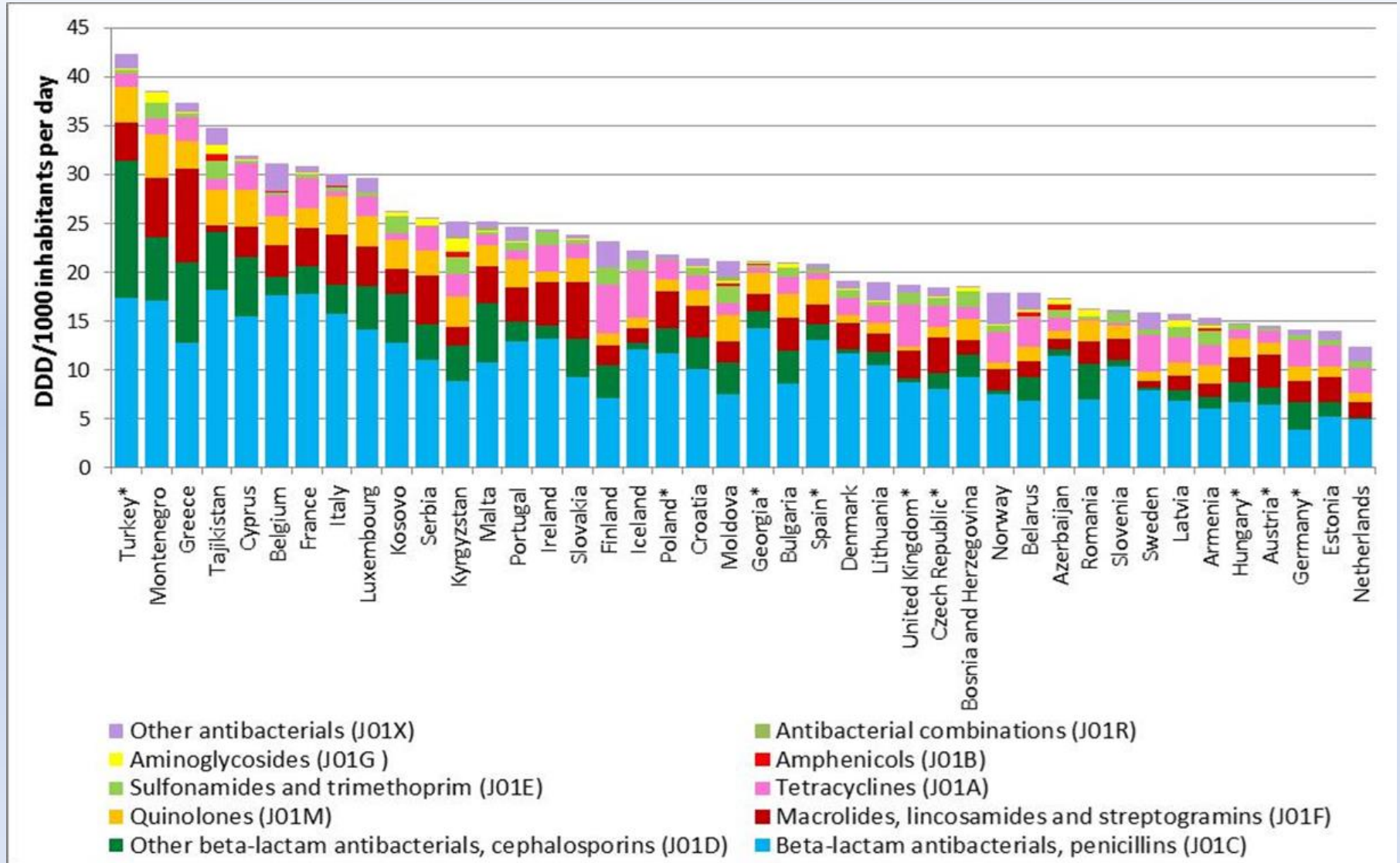


Reçetesiz Antibiyotik Kullanımı Sıklığı

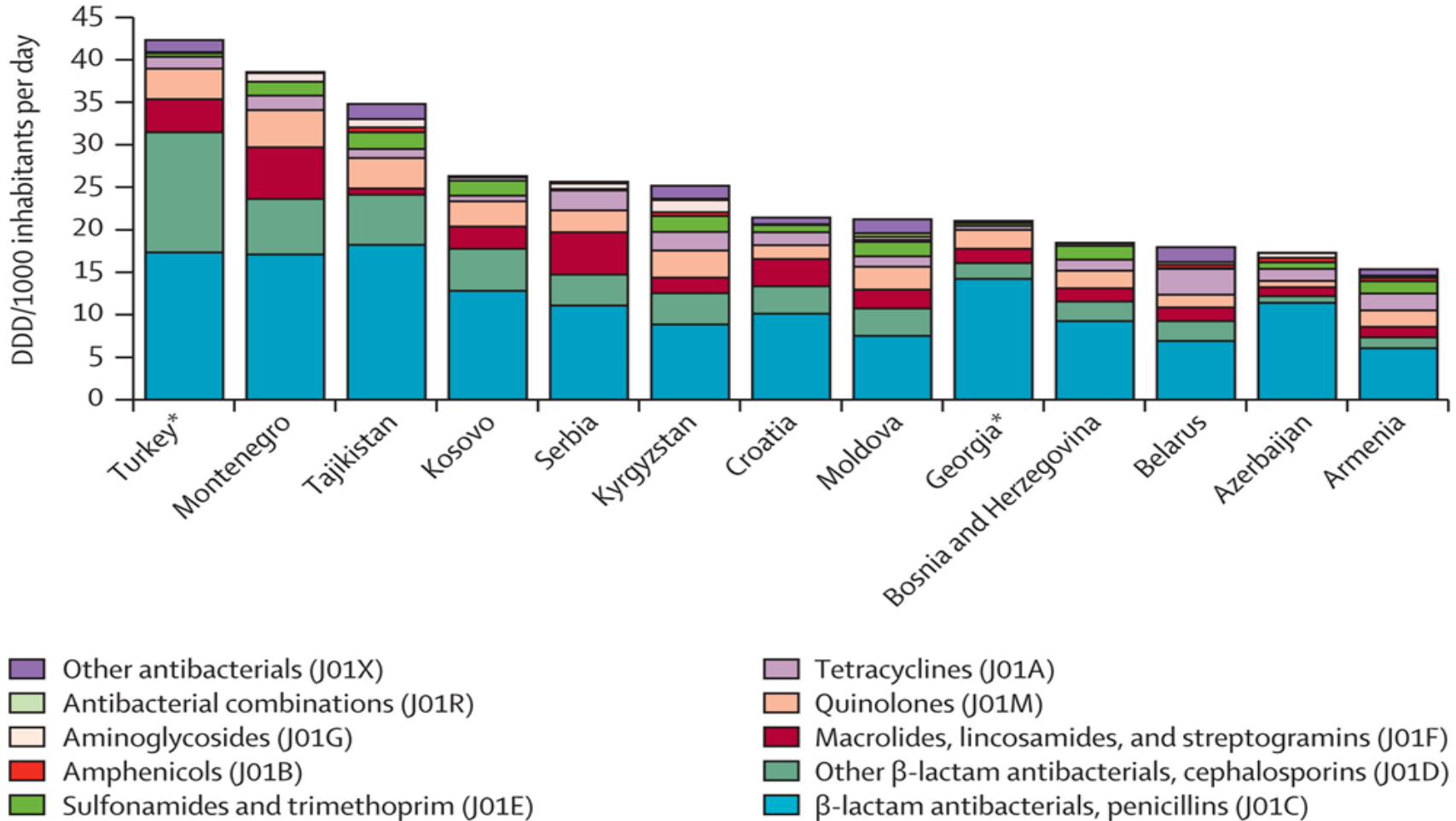


Morgan DJ, et al. Non-prescription antimicrobial use worldwide: a systematic review
Lancet Infect Dis. 2011; 11(9): 692-701.

Avrupa Ülkelerinde Antibiyotik Tüketimi



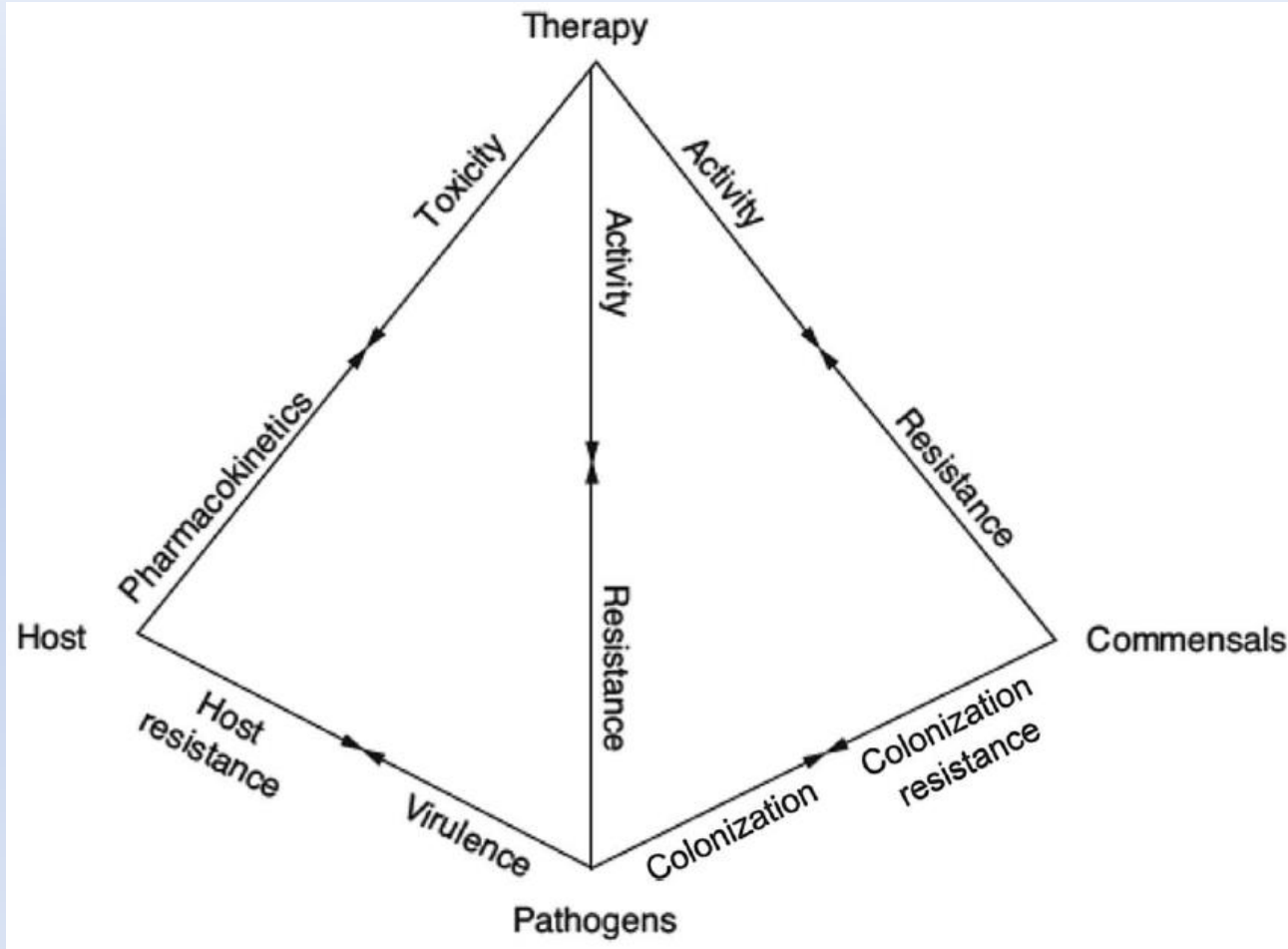
Avrupa'nın Doğusundaki Ülkelerde Antibiyotik Tüketimi



Aile Hekimleri ve Diğer Hekimlerin E-Reçetelerindeki Antibiyotik Oranları: 2013-2015

	Aile Hekimi			Diğer Hekimler		
Yıl	2013	2014	2015	2013	2014	2015
Reçete Sayısı	116.063.545	137.313.632	128.524.357	64.610.084	104.419.608	104.260.408
Antibiyotik Bulunan Reçete Sayısı	39.403.316 % 33,95	43.214.090 % 31,47	39.932.198 % 31,07	24.974.170 % 38,65	38.002.128 % 36,39	37.591.482 % 36,06

İnsan, Mikroorganizma ve Antibiyotik Arasındaki Etkileşim Piramidi



Antibiyotik Kullanımı ve Direnç Gelişimi Arasındaki İlişki

- Antibiyotik kullanımındaki değişiklikler, direnç prevalansında değişikliklere neden olur.
- Antibiyotik direnci, sağlık bakımıyla ilişkili bakteriyel infeksiyonlarda, toplum kökenli infeksiyonlara oranla daha sık görülür.
- Dirençli suşların neden olduğu sağlık bakımıyla ilişkili infeksiyonlar, daha önce antibiyotik almış hastalarda daha fazla görülür.
- Hastanelerde direnç hızlarının en yüksek olduğu bölümler, aynı zamanda en çok antibiyotik kullanılan bölümlerdir.
- Hastanın antibiyotiklerle karşılaşma süresi uzadıkça dirençli bakterilerle kolonizasyona uğraması olasılığı da artar.

Antibiyotik Kullanımı: Dirençli Bakteri İnfeksiyonlarının Artışı

- **E**nterokoklar: Vankomisine direnç (VRE)
- **S***ta*phylococcus *aureus*: MRSA ve VISA
- **K**lebsiella spp.: Karbapenemaz yapımı
- **A**cinetobacter spp.: Çoğul dirençli
- **P**seudomonas *aeruginosa*: Çoğul dirençli
- **E**nterobacteriaceae: ESBL yapımı
- **C**lostridium *difficile*: Daha virülan suşlar

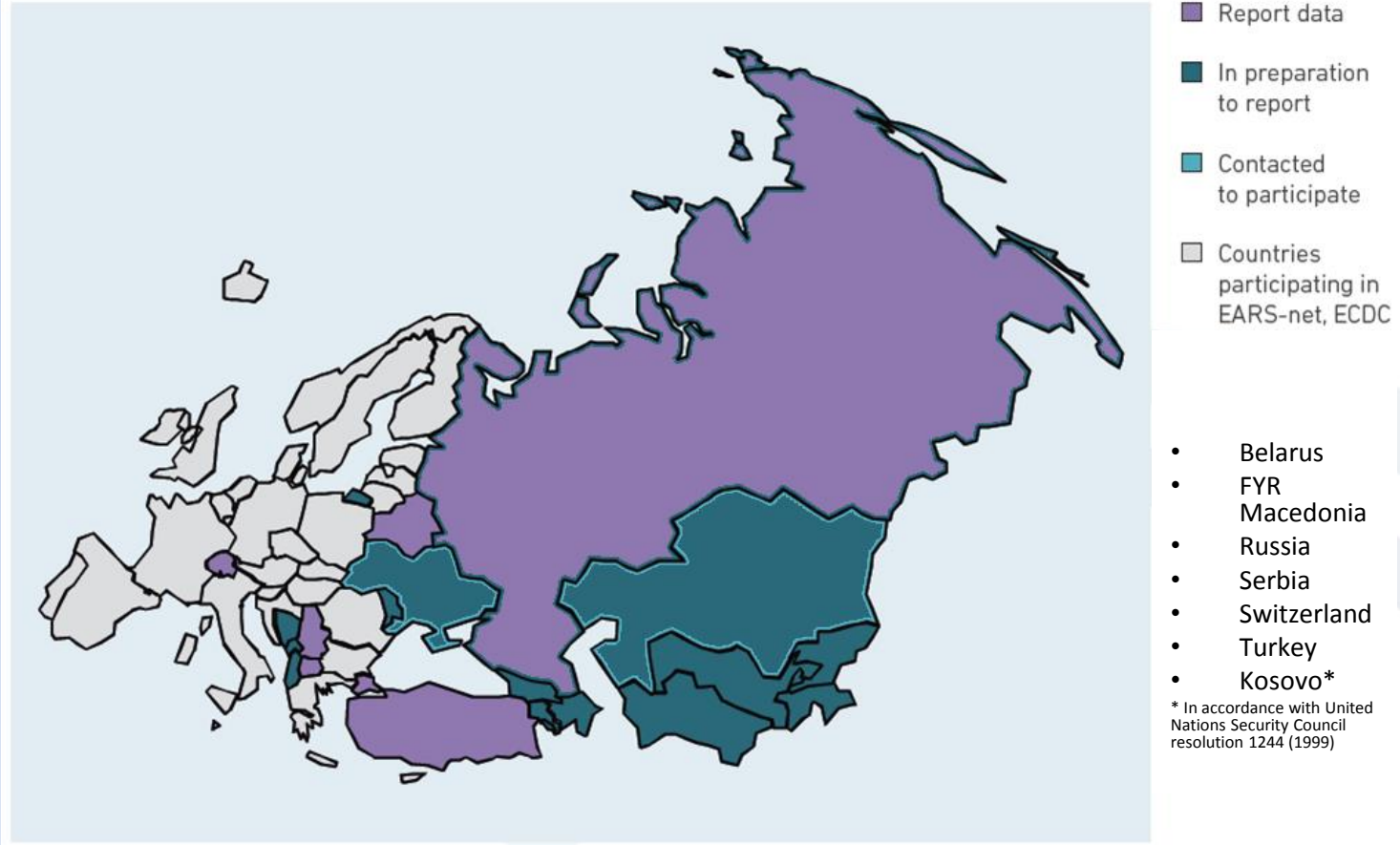
MacDougall C. Antimicrobial stewardship. In: Bennett JE, et al. eds. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 8th ed. Philadelphia: Elsevier Saunders, 2015: 605-11.

EARS-Net ve UAMDDSS Verileri

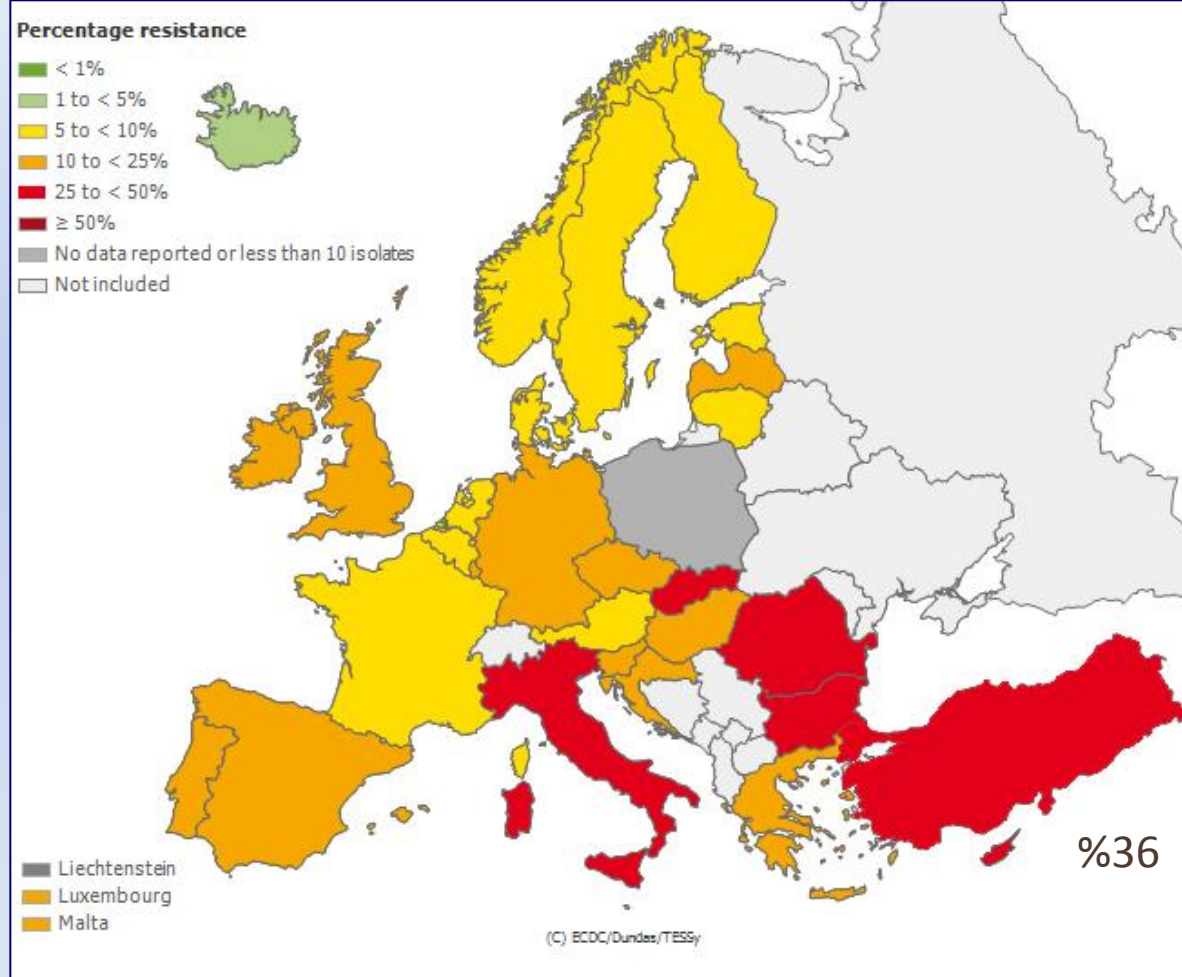


Orta Asya ve Doğu Avrupa Antimikrobiyal Direnç Sürveyans Ağına (CAESAR) Katılan Ülkeler

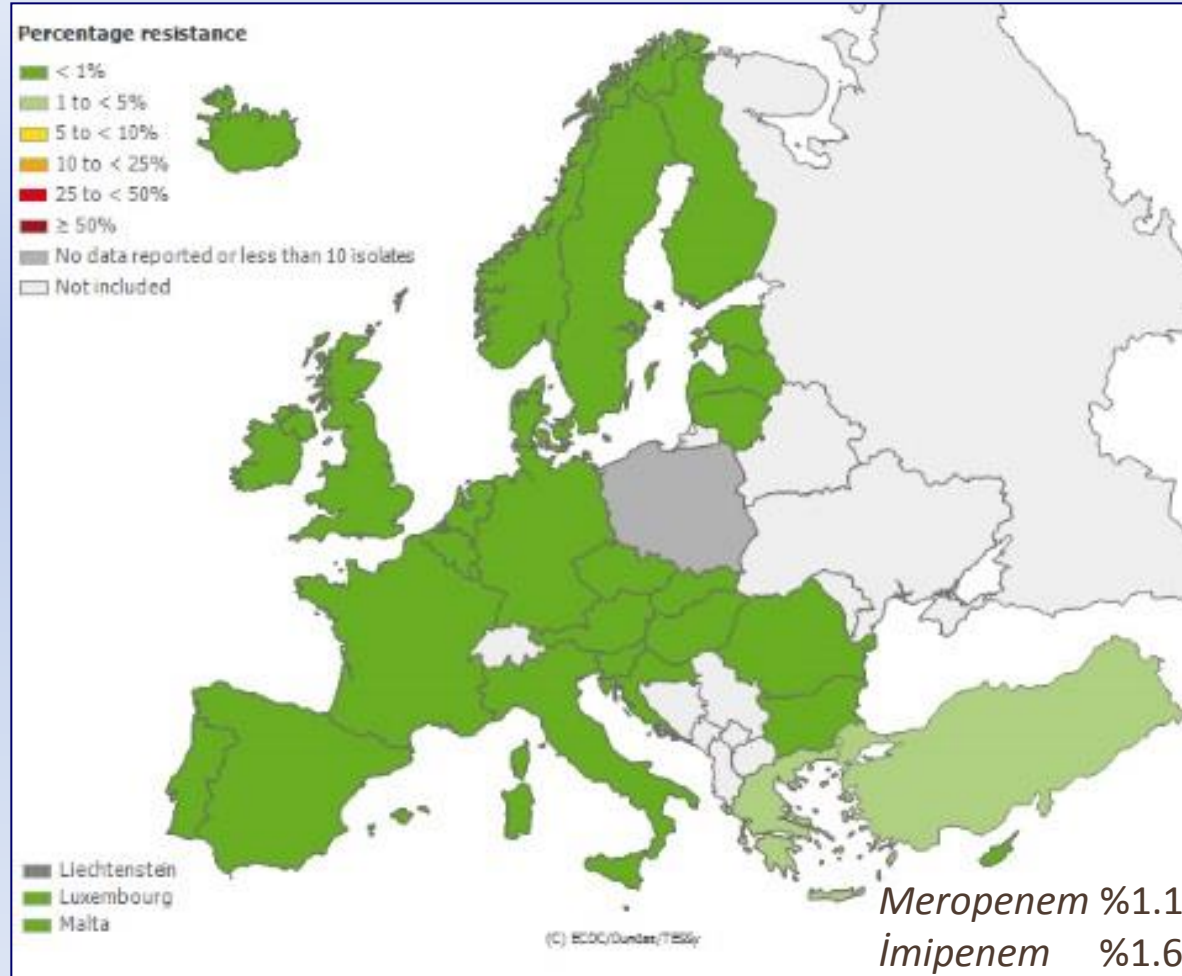
Fig. 1. Status of countries reporting AMR data to the CAESAR database



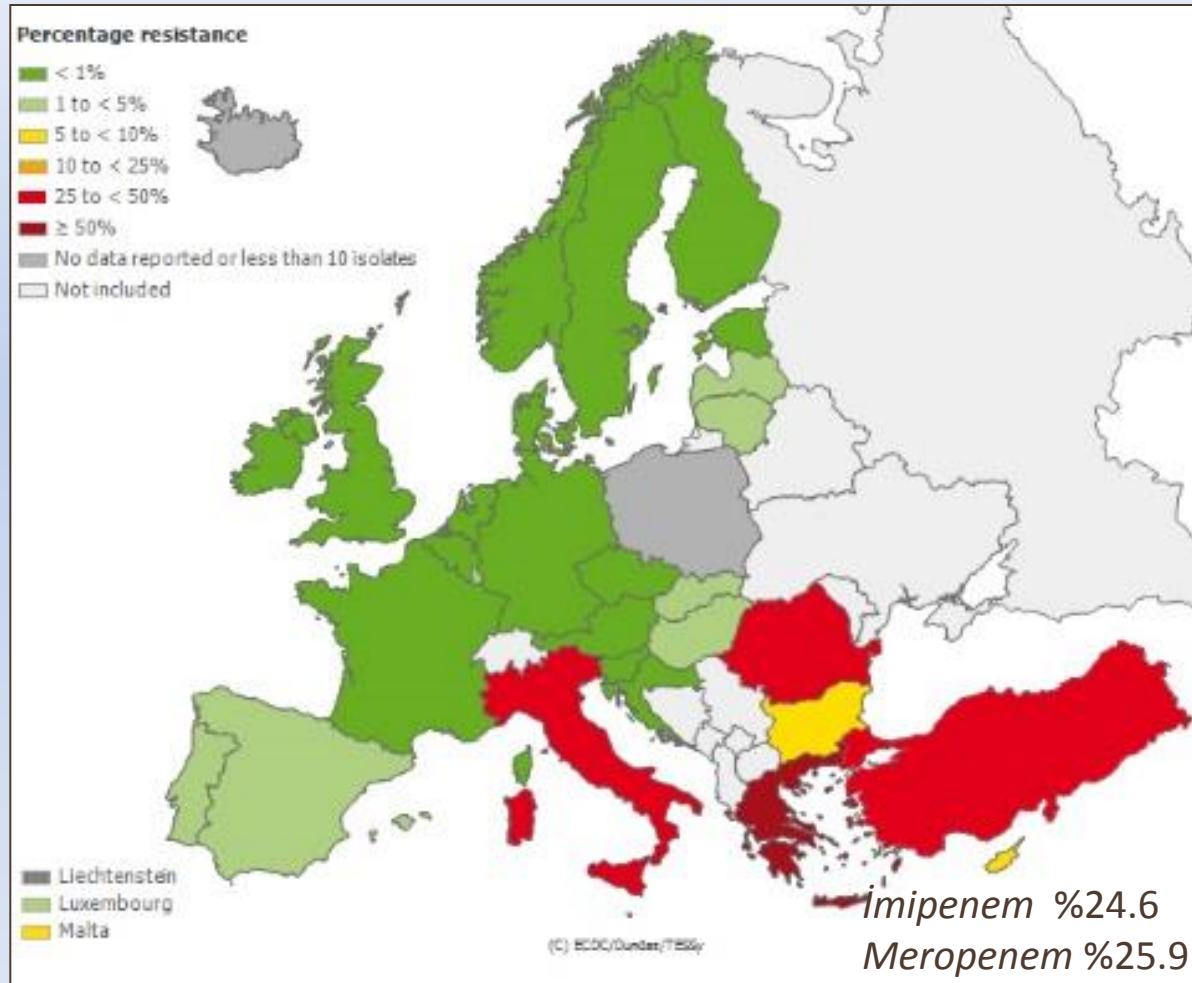
Avrupa Birliği* ve Türkiye'deki** İnvazif *Escherichia coli* Suşlarında Üçüncü Kuşak Sefalosporin Direnci: 2014

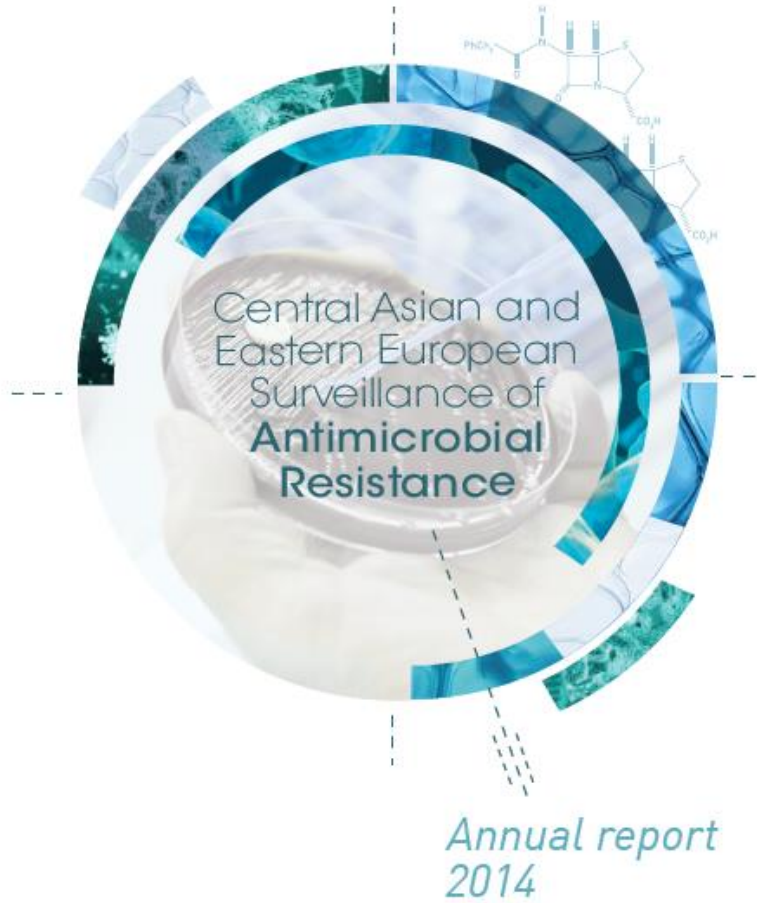


Avrupa Birliği* ve Türkiye'deki** İnvazif *Escherichia coli* Suşlarında Karbapenem Direnci: 2014

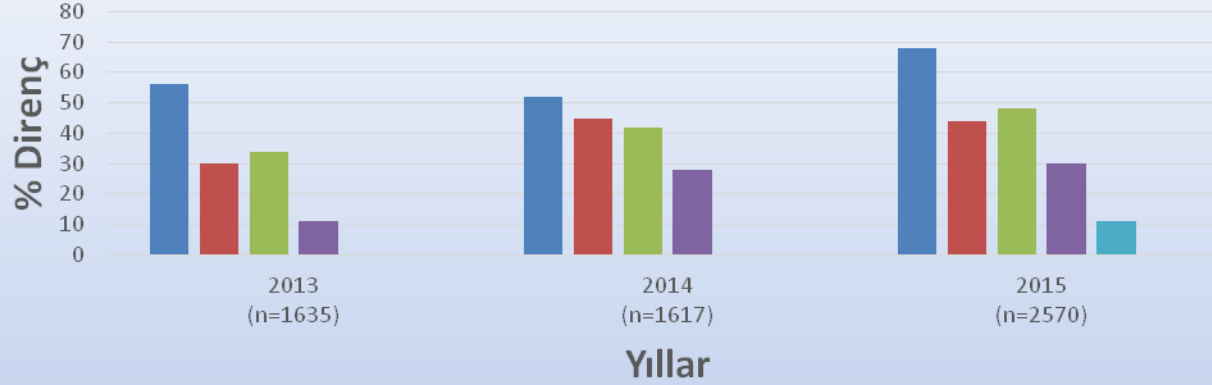


Avrupa Birliği* ve Türkiye'deki** İnvazif *Klebsiella pneumoniae* Suşlarında Karbapenem Direnci: 2014





Türkiye’de* İnvazif *Klebsiella pneumoniae* Suşlarında Direnç: 2013-2015

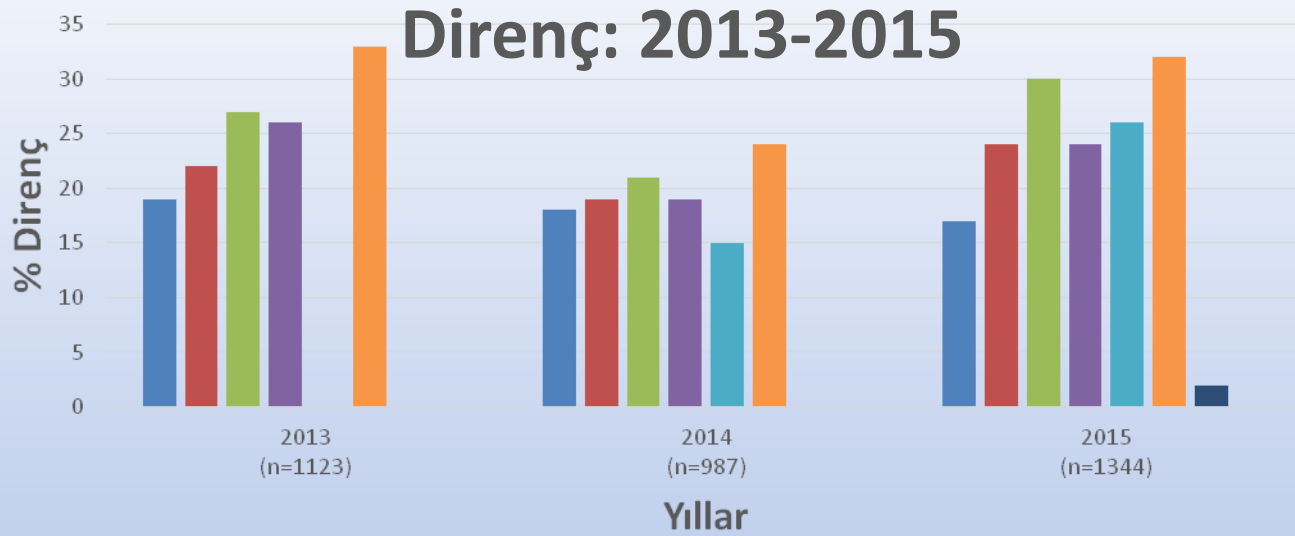


■ Üçüncü kuşak sefalosporinler ■ Aminoglikozidler
■ Kinolonlar ■ Karbapenemler
■ Kolistin

Yıl	Üçüncü kuşak sefalosporinler	Aminoglikozidler	Kinolonlar	Karbapenemler	Kolistin
2013					
(n=1635)	56	30	34	11	
2014					
(n=1617)	52	45	42	28	
2015					
(n=2570)	68	44	48	30	11

*UAMDSS / CAESAR verilerine göre

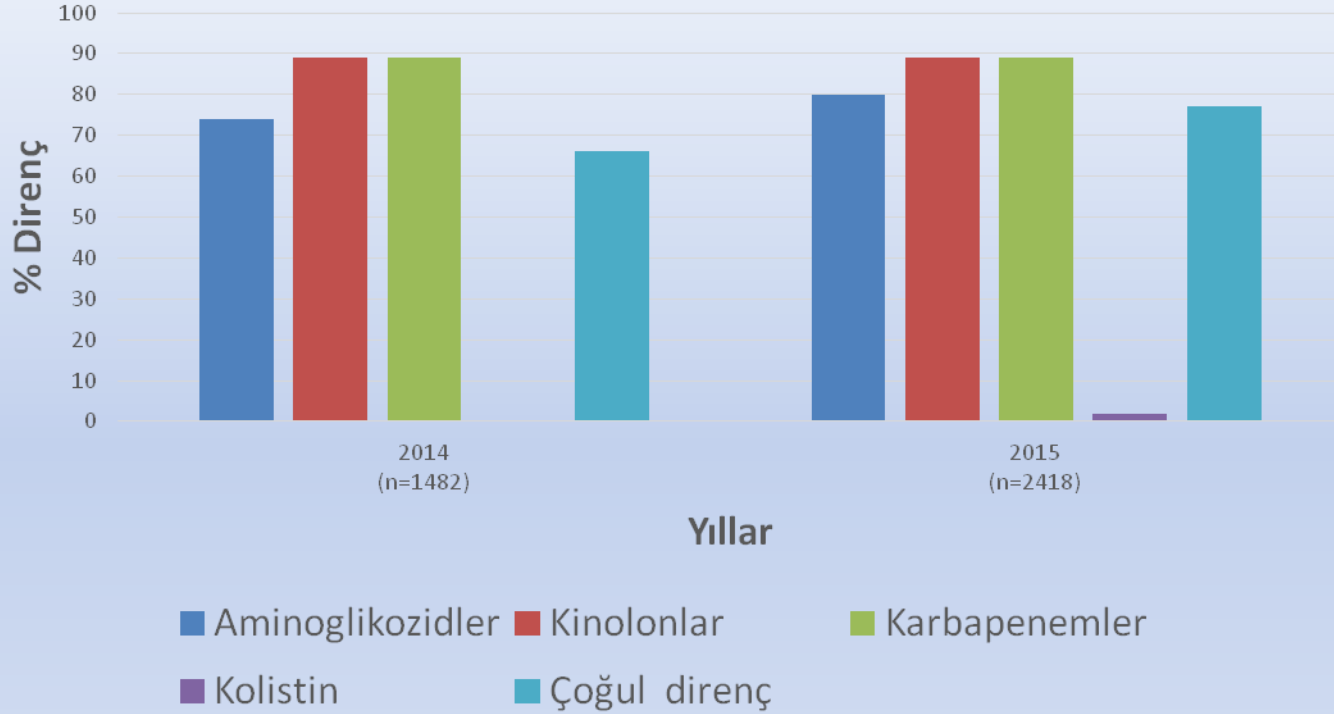
Türkiye’de* İnvazif *Pseudomonas aeruginosa* Suşlarında



Yıl	Aminoglikozidler	Kinolonlar	Piperasilin-tazobaktam	Seftazidim	Sefepim	Karbapenemler	Kolistin
2013 (n=1123)	19	22	27	26		33	
2014 (n=987)	18	19	21	19	15	24	
2015 (n=1344)	17	24	30	24	26	32	2

*UAMDSS / CAESAR verilerine göre

Türkiye’de* İnvazif *Acinetobacter* spp. Suşlarında Direnç: 2013-2015



Yıl	Aminoglikozidler	Kinolonlar	Karbapenemler	Kolistin	Çoğul direnç
2014					
(n=1482)	74	89	89	0	66
2015					
(n=2418)	80	89	89	2	77

Antibiyotikler Daha Etkin Kullanılmalı

- Antibiyotik direnci ► Kaçınılmaz
- Yeni antibiyotikler ► Keşfedilmeli / geliştirilmeli
- Yeni antibiyotik keşfetmek / geliştirmek ► Pahalı
- Antibiyotik tedavisi ► Süresi nispeten kısa
- Yeni antibiyotik yatırımı ► Kârı nispeten az
- Elimizdeki seçenekler ► Korunmalı
- Sonuç: Antibiyotikler daha etkin kullanılmalı

Hand K. *Clin Med.* 2013; 13(5): 499-503.

Antibiyotikler Korunmalı

- Direncin hızını ve yaygınlığını belirleyen ► İnsan davranışı!
 - Antibiyotik tüketimi: İnsan ve hayvan için
 - Hijyen
 - Sanitasyon
 - Enfeksiyon kontrolü
- Hastaları ve toplumu direncin etkilerinden korumak ► Etik zorunluluk!

Hand K. *Clin Med.* 2013; 13(5): 499-503.

Antibiyotikler Başka İlaçlara Benzemez

- Olumsuz sonuçları, o ilaçları kullanmamış kişiler üzerinde de ortaya çıkabilir.
- Kullanılmaları arttıkça, yararlılıkları azalır.
- 1970'lerden itibaren hastanelerde uygun antibiyotik kullanımını artırmak üzere antimikrobiyal “**management**” ya da “**control**” programları uygulanmaktaydı.
- 1996'de ilk kez “**stewardship**” terimi kullanıldı.

MacDougall C. Antimicrobial stewardship. In: Bennett JE, et al. eds. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 8th ed. Philadelphia: Elsevier Saunders, 2015: 605-11.

Antimicrobial-use “stewardship”

New Horiz. 1996 Aug;4(3):370-6.

Does antibiotic restriction prevent resistance?

McGowan JE Jr¹, Gerding DN.

⊕ Author information



Abstract

Antimicrobial resistance among some hospital organisms has increased to a stage where it can no longer be tolerated. The need for preventive and corrective measures is urgent. There is an association between the use of antimicrobial agents and resistance that is likely causal. Alterations in antimicrobial usage have been shown to affect antimicrobial resistance rates, particularly with use of aminoglycosides. Efforts to improve antimicrobial use through educational efforts alone have been largely ineffective, even when coupled with quality management or clinical guideline aspects. Thus, further work is urgently needed to determine the impact of antimicrobial-use controls. Additional large-scale, well controlled trials of antimicrobial-use regulation employing sophisticated epidemiologic methods, molecular biological organism typing, and precise resistance mechanism analysis will be required to determine the best methods to prevent and control this problem and ensure our optimal antimicrobial-use "stewardship." Consideration of the long-term effects of antimicrobial selection, dosage, and duration of treatment on resistance development should be a part of every antimicrobial treatment decision.

“Stewardship”

- Sınırlı kaynakların sağduyulu bir biçimde planlaması ve yönetimi
- Bir ahlak sistemi
 - “Environmental stewardship”
 - “Marine stewardship”
 - “Forest stewardship”
 - **“Antimicrobial stewardship”**
- Koruma, kollama, sakınma, (gözü gibi) bakma, üzerine titreme, üstüne düşme

ANTİMİKROBİYAL YÖNETİM SİMPOZYUMU

ANTIMICROBIAL STEWARDSHIP

6-8 EKİM 2016, İSTANBUL



KLİMİK

TÜRK KLİNİK MİKROBİYOLOJİ VE
İNFEKSİYON HASTALIKLARI DERNEĞİ

www.klimik.org.tr klimik@klimik.org.tr



ADÇG

KLİMİK DERNEĞİ
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EUROPEAN SOCIETY
OF CLINICAL MICROBIOLOGY
AND INFECTIOUS DISEASES



ESGAP

ESCMID STUDY
GROUP FOR
ANTIBIOTIC POLICIES

European Society of Clinical Microbiology and Infectious Diseases



KLİMİK

TÜRK KLİNİK MİKROBİYOLOJİ VE
İNFEKSİYON HASTALIKLARI DERNEĞİ

“Antimicrobial Stewardship”

- Amaç
 - ▶ Antibiyotiklerin gelecekte de etkili olabilmeleri
 - ▶ Halk sağlığının korunması
- Tanım
 - ▶ Sağduyulu bir biçimde / sorumluluk duyarak kullanmayı
 - ▶ Özendirme

Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship

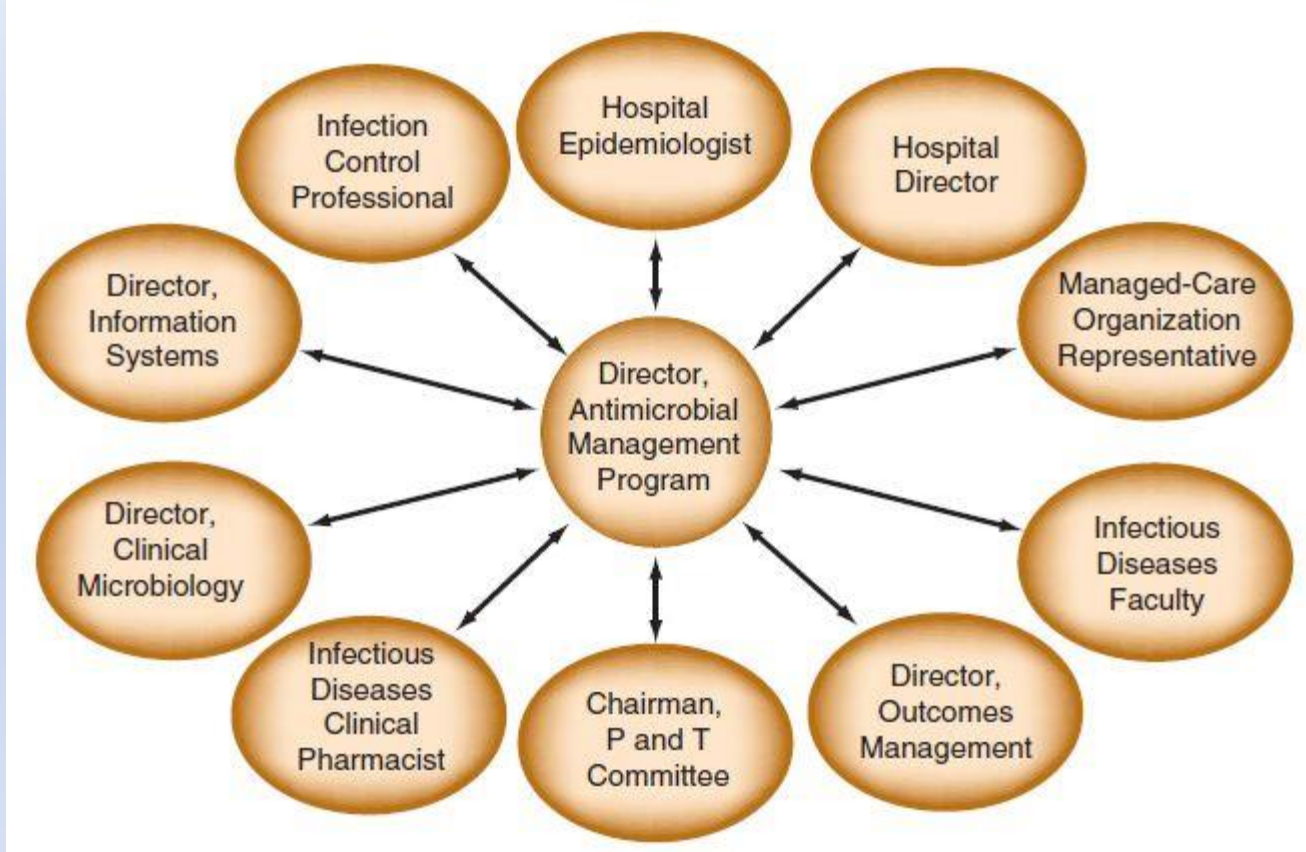
Timothy H. Dellit,¹ Robert C. Owens,² John E. McGowan, Jr.,³ Dale N. Gerding,⁴ Robert A. Weinstein,⁵ John P. Burke,⁶ W. Charles Huskins,⁷ David L. Paterson,⁸ Neil O. Fishman,⁹ Christopher F. Carpenter,¹⁰ P. J. Brennan,⁹ Marianne Billeter,¹¹ and Thomas M. Hooton¹²

¹Harborview Medical Center and the University of Washington, Seattle; ²Maine Medical Center, Portland; ³Emory University, Atlanta, Georgia;

⁴Hines Veterans Affairs Hospital and Loyola University Stritch School of Medicine, Hines, and ⁵Stroger (Cook County) Hospital and Rush University Medical Center, Chicago, Illinois; ⁶University of Utah, Salt Lake City; ⁷Mayo Clinic College of Medicine, Rochester, Minnesota;

⁸University of Pittsburgh Medical Center, Pittsburgh, and ⁹University of Pennsylvania, Philadelphia, Pennsylvania; ¹⁰William Beaumont Hospital, Royal Oak, Michigan; ¹¹Ochsner Health System, New Orleans, Louisiana; and ¹²University of Miami, Miami, Florida

Antibiyotik Yönetiminde Örgütlenmenin Yapısı



MacDougall C. Antimicrobial stewardship. In: Bennett JE, et al. eds. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 8th ed. Philadelphia: Elsevier Saunders, 2015: 605-11.

“Antimicrobial Stewardship”

- “Antimicrobial stewardship” kavramının hekimlerce algılanması
 - ▶ Dayatmacı / Rencide edici
 - ▶ Klinik özgürlüğe / özerkliğe aykırı

SHEA/IDSA/PIDS POLICY STATEMENT

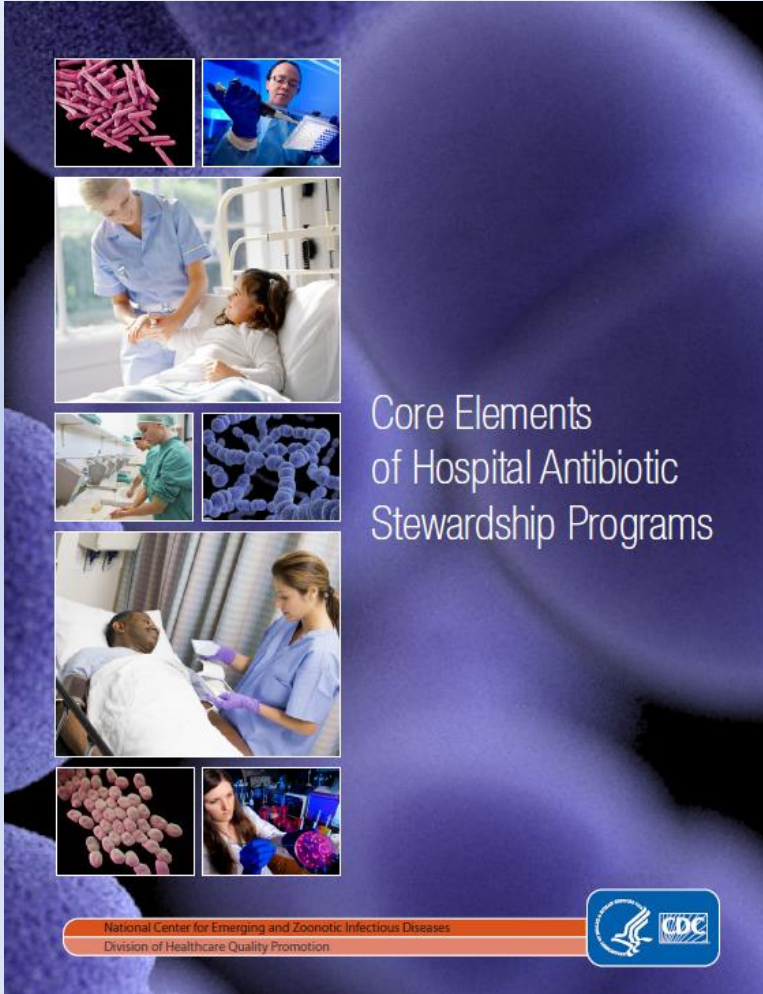
Policy Statement on Antimicrobial Stewardship by the Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), and the Pediatric Infectious Diseases Society (PIDS)

Society for Healthcare Epidemiology of America; Infectious Diseases Society of America;
Pediatric Infectious Diseases Society

Antimicrobial resistance has emerged as a significant healthcare quality and patient safety issue in the twenty-first century that, combined with a rapidly dwindling antimicrobial armamentarium, has resulted in a critical threat to the public health of the United States. Antimicrobial stewardship programs optimize antimicrobial use to achieve the best clinical outcomes while minimizing adverse events and limiting selective pressures that drive the emergence of resistance and may also reduce excessive costs attributable to suboptimal antimicrobial use. Therefore, antimicrobial stewardship must be a fiduciary responsibility for all healthcare institutions across the continuum of care. This position statement of the Society for Healthcare Epidemiology of America, the Infectious Diseases Society of America, and the Pediatric Infectious Diseases Society of America outlines recommendations for the mandatory implementation of antimicrobial stewardship throughout health care, suggests process and outcome measures to monitor these interventions, and addresses deficiencies in education and research in this field as well as the lack of accurate data on antimicrobial use in the United States.

Infect Control Hosp Epidemiol 2012;33(4):322-327

Hastane Antibiyotik Yönetim Programının Temel Öğeleri



- Yönetici kararlılığı
- Hesap verebilirlik
- Antibiyotik bilgisi
- Eylemde bulunma
- Direnç eğilimlerinin izlenmesi
- Bildirimde bulunma
- Eğitim verme

National Quality Partners Playbook: Antibiotic Stewardship in Acute Care

NATIONAL QUALITY FORUM
NATIONAL QUALITY PARTNERS
ANTIBIOTIC STEWARDSHIP ACTION TEAM



NATIONAL
QUALITY FORUM



KLİMİK TÜRK KLİNİK MİKROBİYOLOJİ VE
İNFEKSİYON HASTALIKLARI DERNEĞİ



Contents lists available at ScienceDirect

International Journal of Antimicrobial Agents

journal homepage: www.elsevier.com/locate/ijantimicag



Review

Ten key points for the appropriate use of antibiotics in hospitalised patients: a consensus from the Antimicrobial Stewardship and Resistance Working Groups of the International Society of Chemotherapy



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Andrea Endimiani ^f, Heiman F.L. Wertheim ^{g,h}, Carlos Amábile-Cuevas ⁱ, Pierre Tattevin ^j,
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^e University of Miami Miller School of Medicine, Miami, FL, USA

^f Institute for Infectious Diseases, University of Bern, Bern, Switzerland

^g Nuffield Department of Medicine, University of Oxford, UK

^h Department of Medical Microbiology, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands

ⁱ Fundación Lusara, Mexico City, Mexico

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ⁿ Medical Microbiology, Aberdeen Royal Infirmary, Foresterhill, Aberdeen, Scotland, UK

Hastanede Uygun Antibiyotik Kullanımına İlişkin

On Kilit Nokta

- (i) Antibiyotik vermeden önce, uygun mikrobiyolojik örnekleri alınız ve sonuçlarını dikkatle yorumlayınız. Çünkü infeksiyonun klinik bulguları yoksa, kolonizasyonu tedavi etmek gerekmez.
- (ii) Tedaviye başlamadan önce ateşin gerçek nedenini araştırınız ve antibiyotikleri, ateşi “tedavi etmek” için değil, infeksiyonları tedavi etmek için kullanınız.
- (iii) Ampirik antibiyotik tedavisine, kültürleri aldıktan sonra, infeksiyon bölgesini, çoğul dirençli bakteriler yönünden risk faktörlerini, yerel mikrobiyoloji ve duyarlılık eğilimlerini göz önünde bulundurarak başlayınız.
- (iv) Antibiyotikleri, klinik duruma ve hasta özelliklerine uygun bir biçimde, optimal dozda ve uygun süreyle veriniz.
- (v) Antibiyotik kombinasyonlarını, ancak bir yararının olacağına ilişkin kanıtların varlığında kullanınız.

Hastanede Uygun Antibiyotik Kullanımına İlişkin On Kilit Nokta

- (vi)** Mümkün olduğunca direnç ya da hastane infeksiyonu gelişmesi yüksek olan antibiyotikleri kullanmaktan kaçınınız ya da ancak son çare olarak kullanınız.
- (vii)** İnfekte odakları hızla drene ediniz ve infekte olabilecek ya da olduğu kanıtlanmış araçları çıkarınız. İnfeksiyonun kaynak kontrolünü yapınız.
- (viii)** Antibiyotik tedavisini, klinik duruma ve mikrobiyolojik sonuçlara göre daima gözden geçiriniz / de-eskalasyon yapınız.
- (ix)** İnfeksiyonun olmadığı anlaşıldığında gereksiz yere verilen antibiyotikleri kesiniz.
- (x)** Tek başınıza hareket etmeyiniz. Yerel takımınızı, infeksiyon hastalıkları uzmanı, klinik mikrobiyolog, hastane eczacısı, infeksiyon kontrol hekimi ya da hastane epidemiyoloğuyla kurunuz. Hastanenin antibiyotik politikalarına ve kılavuzlarına uyunuz.

Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America

Tamar F. Barlam,^{1,a} Sara E. Cosgrove,^{2,a} Lilian M. Abbo,³ Conan MacDougall,⁴ Audrey N. Schuetz,⁵ Edward J. Septimus,⁶ Arjun Srinivasan,⁷ Timothy H. Dellit,⁸ Yngve T. Falck-Ytter,⁹ Neil O. Fishman,¹⁰ Cindy W. Hamilton,¹¹ Timothy C. Jenkins,¹² Pamela A. Lipsett,¹³ Preeti N. Malani,¹⁴ Larissa S. May,¹⁵ Gregory J. Moran,¹⁶ Melinda M. Neuhauser,¹⁷ Jason G. Newland,¹⁸ Christopher A. Ohl,¹⁹ Matthew H. Samore,²⁰ Susan K. Seo,²¹ and Kavita K. Trivedi²²

¹Section of Infectious Diseases, Boston University School of Medicine, Boston, Massachusetts; ²Division of Infectious Diseases, Johns Hopkins University School of Medicine, Baltimore, Maryland; ³Division of Infectious Diseases, University of Miami Miller School of Medicine, Miami, Florida; ⁴Department of Clinical Pharmacy, School of Pharmacy, University of California, San Francisco; ⁵Department of Medicine, Weill Cornell Medical Center/New York–Presbyterian Hospital, New York, New York; ⁶Department of Internal Medicine, Texas A&M Health Science Center College of Medicine, Houston; ⁷Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia; ⁸Division of Allergy and Infectious Diseases, University of Washington School of Medicine, Seattle; ⁹Department of Medicine, Case Western Reserve University and Veterans Affairs Medical Center, Cleveland, Ohio; ¹⁰Department of Medicine, University of Pennsylvania Health System, Philadelphia; ¹¹Hamilton House, Virginia Beach, Virginia; ¹²Division of Infectious Diseases, Denver Health, Denver, Colorado; ¹³Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University Schools of Medicine and Nursing, Baltimore, Maryland; ¹⁴Division of Infectious Diseases, University of Michigan Health System, Ann Arbor; ¹⁵Department of Emergency Medicine, University of California, Davis; ¹⁶Department of Emergency Medicine, David Geffen School of Medicine, University of California, Los Angeles Medical Center, Sylmar; ¹⁷Department of Veterans Affairs, Hines, Illinois; ¹⁸Department of Pediatrics, Washington University School of Medicine in St. Louis, Missouri; ¹⁹Section on Infectious Diseases, Wake Forest University School of Medicine, Winston-Salem, North Carolina; ²⁰Department of Veterans Affairs and University of Utah, Salt Lake City; ²¹Infectious Diseases, Memorial Sloan Kettering Cancer Center, New York, New York; and ²²Trivedi Consults, LLC, Berkeley, California

Evidence-based guidelines for implementation and measurement of antibiotic stewardship interventions in inpatient populations including long-term care were prepared by a multidisciplinary expert panel of the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. The panel included clinicians and investigators representing internal medicine, emergency medicine, microbiology, critical care, surgery, epidemiology, pharmacy, and adult and pediatric infectious diseases specialties. These recommendations address the best approaches for antibiotic stewardship programs to influence the optimal use of antibiotics.

Keywords. antibiotic stewardship; antibiotic stewardship programs; antibiotics; implementation.

Antibiyotik Gözetim Stratejilerinin Karşılaştırılması: EHU Onayı (Ön İzin) ve Sonradan Denetim Stratejilerinin Avantajları

Preauthorization	Prospective Audit and Feedback
Advantages	
• Reduces initiation of unnecessary/ inappropriate antibiotics • Optimizes empiric choices and influences downstream use • Prompts review of clinical data/ prior cultures at the time of initiation of therapy • Decreases antibiotic costs, including those due to high-cost agents • Provides mechanism for rapid response to antibiotic shortages • Direct control over antibiotic use	• Can increase visibility of antimicrobial stewardship program and build collegial relationships • More clinical data available for recommendations, enhancing uptake by prescribers • Greater flexibility in timing of recommendations • Can be done on less than daily basis if resources are limited • Provides educational benefit to clinicians • Prescriber autonomy maintained • Can address de-escalation of antibiotics and duration of therapy

Antibiyotik Gözetim Stratejilerinin Karşılaştırılması: EHU Onayı (Ön İzin) ve Sonradan Denetim Stratejilerinin Dezavantajları

Preauthorization	Prospective Audit and Feedback
Disadvantages	
• Impacts use of restricted agents only • Addresses empiric use to a much greater degree than downstream use • Loss of prescriber autonomy • May delay therapy • Effectiveness depends on skill of approver • Real-time resource intensive • Potential for manipulation of system (eg, presenting request in a biased manner to gain approval) • May simply shift to other antibiotic agents and select for different antibiotic-resistance patterns	• Compliance voluntary • Typically labor-intensive • Success depends on delivery method of feedback to prescribers • Prescribers may be reluctant to change therapy if patient is doing well • Identification of interventions may require information technology support and/or purchase of computerized surveillance systems • May take longer to achieve reductions in targeted antibiotic use

Antibiyotik Yönetim Programının Değerlendirilmesi: Süreç ve Sonuç Ölçütleri

Process Measures	Outcome Measures
Excess days of therapy (ie, unnecessary days of therapy avoided based on accepted targets and benchmarks) ^a	Hospital length of stay 30-day mortality Unplanned hospital readmission within 30 d
Duration of therapy	Proportion of patients diagnosed with hospital-acquired <i>Clostridium difficile</i> infection or other adverse event(s) related to antibiotic treatment ^a
Proportion of patients compliant with facility-based guideline or treatment algorithm ^a	Proportion of patients with clinical failure (eg, need to broaden therapy, recurrence of infection)
Proportion of patients with revision of antibiotics based on microbiology data	
Proportion of patients converted to oral therapy	

Strategies to enhance rational use of antibiotics in hospital: a guideline by the German Society for Infectious Diseases

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Bir Formüler Örneği

Antibiotic (AB)- Group	Appl.	Trade Name	Active agent	Recommended daily dose RDD		DTC
				Normal renal function CrCl > 80 ml/min	Impaired renal function CrCl 80-50 ml/min	
Penicillins	i.v.	Infectocillin	Benzylpenicillin	3 x 10 million IU or 4 x 5 million IU	2 x 10 million IU	€€
	oral	Penicillin V 1 Mega	Phenoxymethyl penicillin	3 x 1 million IE	3 x 1 million IU	€
Aminopenicillins	i.v.	Ampicillin	Ampicillin	3 x 2 g	2 x 2 g	€€
	oral	AmoxiHexal	Amoxicillin	3 x 1 g	3 x 1 g	€
Aminopenicillins + beta-lactamase inhibitors	i.v.	Ampicillin+ Sulbactam	Ampicillin/ Sulbactam	3 x 2000/1000 mg	2 x 2000/1000mg	€€
	oral	Amoclav 500 plus	Amoxicillin/ Clavulanic acid	3 x 500/125 mg	3 x 500/125 mg	€
Acylaminopenicillins	i.v.	Piperacillin	Piperacillin	3 x 4 g	2 x 4 g	€€
Acylaminopenicillins + beta-lactamase inhibitors	i.v.	Piperacillin+ Tazobactam	Piperacillin/ Tazobactam	3 x 4g/0,5 g	2 x 4g/0,5 g	€€
Carbapenems	i.v.	Meropenem	Meropenem	3 x 1 g for meningitis: 3 x 2 g	4 x 500 mg	€€€€
Tetracycline	i.v.	DoxyHexal SF	Doxycycline	1 x 200 mg, then	no dose adjustment necessary	€
	oral	DoxyHexal Tabs	Doxycycline	100-200 mg/day		€
Aminoglycosides	i.v.	TobraCell	Tobramycin	1 x 5-6 mg/kg KG	Confer with Senior physician	€€
	i.v.	Gentamicin	Gentamicin	1 x 4,5 mg/kg KG		€€
Nitroimidazoles	i.v.	Metronidazol	Metronidazole	3 x 500 mg	3 x 500 mg	€
	oral	Metronidazol	Metronidazole	3 x 400 mg	3 x 400 mg	€
Oxazolidinons	i.v.	Zyvoxid	Linezolid	2 x 600 mg	2 x 600 mg	€€€€
	oral	Zyvoxid	Linezolid	2 x 600 mg	2 x 600 mg	€€€€
Green: Recommended Antibiotic	As a matter of principle preference should be given to oral drugs, provided that the patient's condition allows					
Yellow: Reserve Antibiotic	The recommended daily dose refers to an adult patient (~ 70 kg)					
Red: Special Antibiotic, Confer with senior physician	DTC: Daily Therapeutic Cost DTC: €: 0 to €2; €€: 2 to €10; €€€: 10 to €25; €€€€: 25 to €50; €€€€€: more than 50 € to €150					
Bold	Available oral antibiotics					



Praktijkgids

Antimicrobial Stewardship
in Nederland



KLİMİK

TÜRK KLİNİK MİKROBİYOLOJİ VE
İNFEKSİYON HASTALIKLARI DERNEĞİ

PERSPECTIVE

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An integrated stewardship model: antimicrobial, infection prevention and diagnostic (AID)

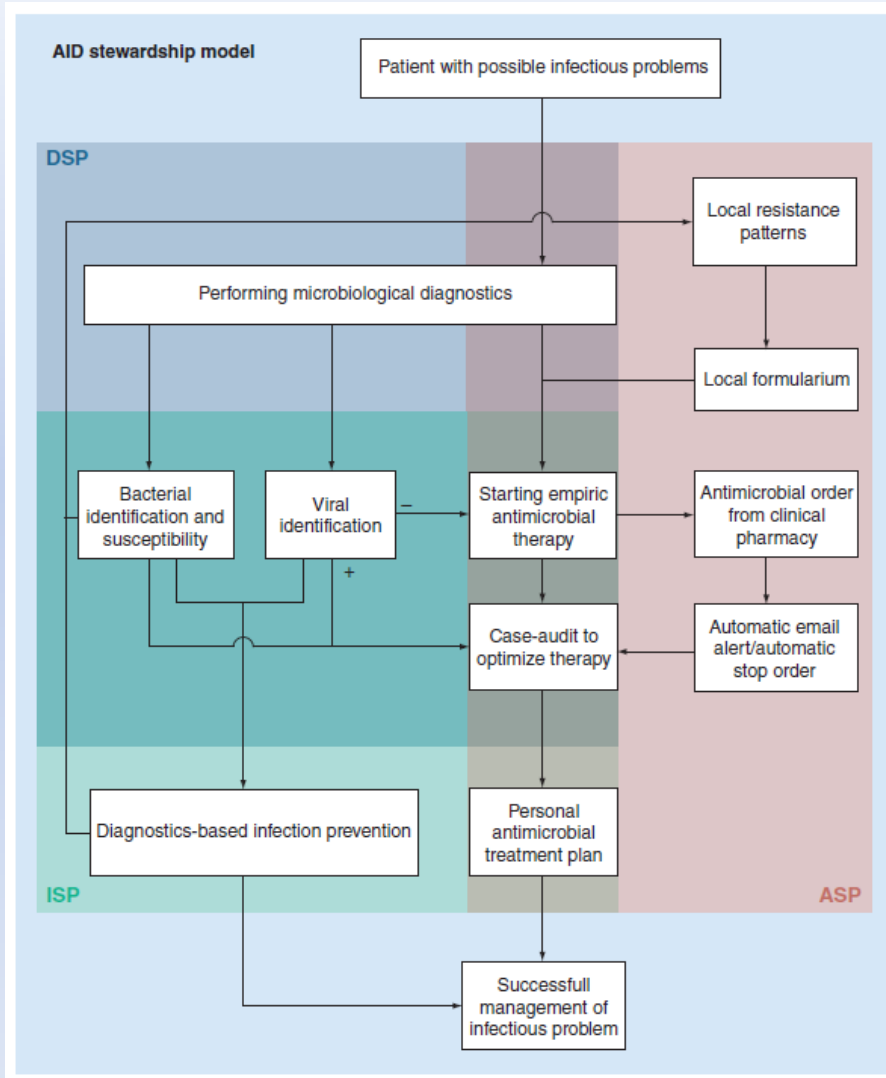
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Considering the threat of antimicrobial resistance and the difficulties it entails in treating infections, it is necessary to cross borders and approach infection management in an integrated, multidisciplinary manner. We propose the antimicrobial, infection prevention and diagnostic stewardship model comprising three intertwined programs: antimicrobial, infection prevention and diagnostic stewardship, involving all stakeholders. The focus is a so-called 'theragnostics' approach. This leads to a personalized infection management plan, improving patient care and minimizing resistance development. Furthermore, it is important that healthcare regions nationally and internationally work together, ensuring that the patient (and microorganism) transfers will not cause problems in a neighboring institution. This antimicrobial, infection prevention and diagnostic stewardship model can serve as a blue print to implement innovative, integrative infection management.

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An integrated stewardship model: antimicrobial, infection prevention and diagnostic (AID)*



ASP: **Antimicrobial** stewardship program
ISP: **Infection prevention** stewardship program
DSP: **Diagnostic** stewardship program

*Dik JWH, et al. *Future Microbiol.* 2015; 11(1): 93-102.

Antibiyotik Kullanımı: Kilit Noktalar

- Son seçeneğimiz olan antibiyotiklere karşı direnç tırmanışa geçmiştir ve küresel bir yayılım göstermektedir. Oysa yeni keşfedilmiş ya da kullanıma girmesi olası antibiyotik sayısı çok azdır.
- Antibiyotik direnci, her bir hasta için morbidite ve mortaliteyi artırdığı gibi halk sağlığı için de ciddi bir tehdit oluşturmaktadır
- Hekimlerin, antibiyotikleri akılcı bir biçimde kullanma ve antibiyotik yönetiminde aktif bir biçimde yer alma sorumlulukları vardır.
- Antibiyotik ancak bir enfeksiyonun olduğuna ilişkin herhangi bir kanıt (ya da makul bir kuşku) olan durumlarda ve derhal verilmelidir.
- Normal floraya kollateral hasarı en aza indirmek ve geniş spektrumlu ajanların etkinliklerini korumak için, güvenli ve etkin oldukları sürece, dar spektrumlu antibiyotikleri seçmek gerekir.