Antibiotic policy

Birgit Ross, MD
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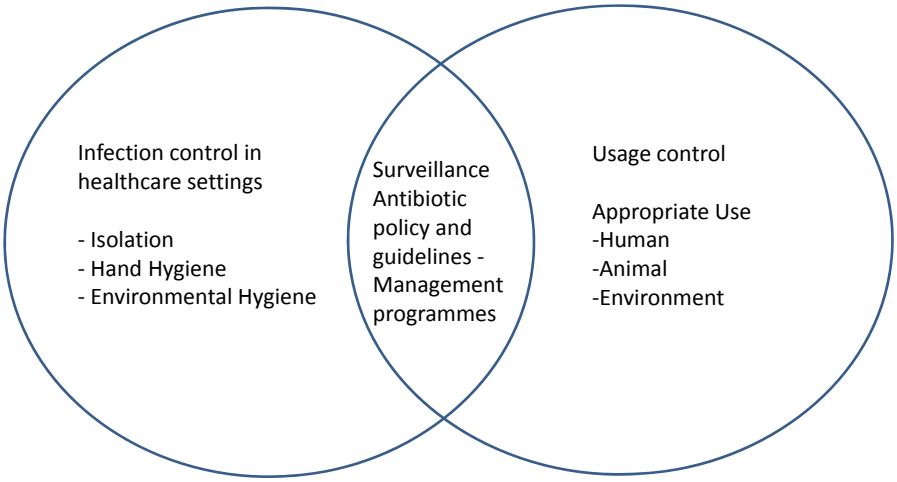

IFIC Basic Concepts

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Some data from Mongolia…

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Eur J Clin Microbiol Infect Dis (2006) 25: 104–107
DOI 10.1007/s10096-006-0102-6

CONCISE ARTICLE

D. Orth · K. Grif · L. Erdenechimeg · C. Battogtokh · T. Hosbayar · B. Strommenger · C. Cuny · G. Walder · C. Lass-Flörl · M.P. Dierich · W. Witte

Characterization of methicillin-resistant *Staphylococcus aureus* from Ulaanbaatar, Mongolia

Published online: 24 February 2006

Abstract In order to expand current knowledge of the types of methicillin-resistant *Staphylococcus aureus* (MRSA) strains circulating in central Asia, six MRSA strains collected from hospitals in Ulaanbaatar, Mongolia during 2000–2002 were examined. Three strains possessed a staphylococcal cassette chromosome *mec* (SCC*mec*) element of type IV c, were sequence type (ST) 154 according to multilocus sequence typing (MLST), and contained *lukS*–*lukF* (Panton–Valentine leukocidin). Another three strains contained a SCC*mec* element of type III and were MLST type ST 239. Using automated ribotyping,

dissemination of particularly epidemic strains [1]. Epidemic MRSA have evolved from successful clonal lineage via acquisition of genetic elements containing the *mec*A gene, which encodes penicillin-binding protein 2′ (PBP2′) with reduced affinity for β-lactam, i.e., the staphylococcal cassette chromosome *mec* (SCC*mec*) [2]. Currently, at least five different groups of SCC*mec* elements are recognized [3].

More recently, community-acquired MRSA (cMRSA) have emerged and spread without any hospital association. cMRSA contain the determinants for Panton–Valentine leukocidin (*lukS*–*lukF*) and SCC*mec* elements of type IV

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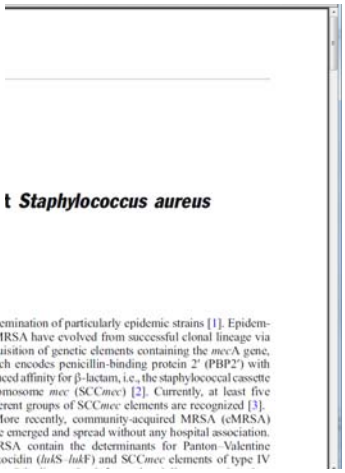
April 2000 – November 2002
207 S. aureus strains were collected
(Hospital No 1, Hospital No 2, Maternal Child Research Institute, National Centre of Communicable Diseases

6 MRSA Strains were found (2,9%)

Germany: about 20 %



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Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

ELSEVIER

Prevalence of hospital-acquired infections and antibiotic use in two tertiary Mongolian hospitals

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[e] Mongolian Association of Infection Control Professionals, Ulaanbaatar, Mongolia

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SUMMARY

Health statistics of Mongolia indicate that hospital-acquired infections (HAIs) occur in 0.01–0.05% of all hospital admissions. This is considerably lower than internationally reported rates. A one-day survey was conducted in two tertiary hospitals of Ulaanbaatar in September 2008 to estimate HAI prevalence, associated risk factors and patterns of antibiotic usage. Among 933 patients surveyed, 50 (5.4%) were diagnosed with HAI. Prevalence of surgical site infection was 1.1% (3.9% among surgical patients), bloodstream infection 0.3%, respiratory tract infection 1.3%, urinary tract infection 1.3%, and other HAI 1.4%. Microbiological investigations were only documented for 18.9% of all patients. A total of 558 patients (59.8%) were taking 902 courses of antibiotics; 92.1% of patients were prescribed antibiotics without a sensitivity test. Multiple logistic regression analysis revealed that HAI was significantly associated with the admission source, the hospital, length of hospital stay, surgical and other invasive procedures, urinary catheters and other indwelling devices. The study results were comparable with reports from some other developing countries and confirm that official statistics underestimate the true frequency of HAI in Mongolia.

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540 households with at least one child < 5

42,3 & had used non-prescribed antibiotics during the previous 6 months

84 % cough
65 % fever
65 % nasal discharge
60 % sore throat

Most common antibiotic: Amoxicillin

Survey of non-prescribed use of antibiotics for children in an urban community in Mongolia
Ganchimeg Togoobaatar et al

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Extensive Antibiotic prescription is directly responsible for the development of Antibiotic resistence in bacteria

High clinical impact:
- Increased morbidity and mortality
- extended hospital stays (increasing coasts and loss of bed days)

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Antibiotic therapy

1. Empirical therapy

Therapy of a probable infection. Culture of the pathogen is not available.
For targeted therapy the most likely pathogens and its resistance profiles should be known.

2. Pathogen directed therapy

Therapy guided by the results of a microbiological investigation.
(Kind of pathogen/resistance profile)

3. Prophylaxis

Use of antibiotics for prevention of infections, eg surgery
The most common pathogens in the special situation should be considered

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Antibiotic stewardship programmes

-Key to modify prescribing practices of physicians and decrease antibiotic consumption

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Improper antibiotic prescribing has been described as „too many patients receiving unnecessary broad sprectrum antibiotics by the wrong route, in the wrong dose, and for too long“

Antibiotics do not act in the patient – they act on the microorganism
So treating one patient may harm others

CDC 2011

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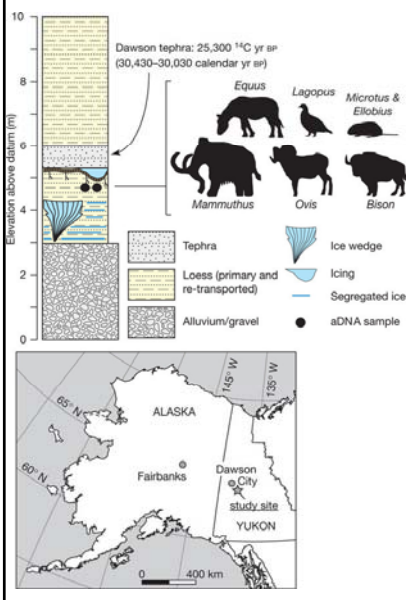


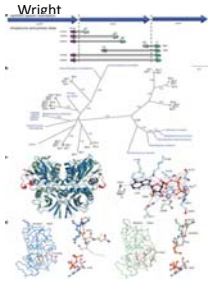
nature international weekly journal of science

22.Sep. 2011

Letter

Antibiotic resistance is ancient

Vanessa M. D'Costa, Christine E. King, Lindsay Kalan, Mariya Morar, Wilson W. L. Sung,Carsten Schwarz, Duane Froese, Grant Zazula, Fabrice Calmels, Regis Debruyne, G. Brian Golding, Hendrik N. Poinar & Gerard D. Wright



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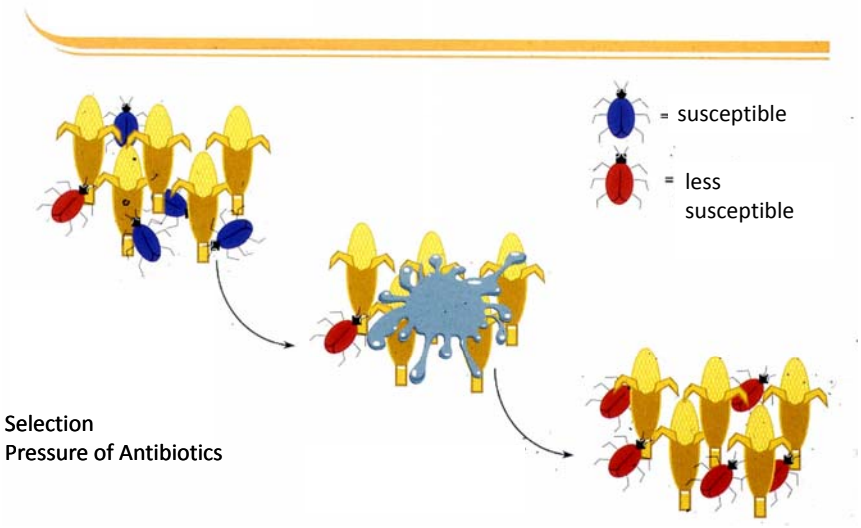

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1. Primary care

Worldwide, primary care is responsible for the majoritiy of antibiotic use by human beings

Many clinicians (and patients) do not see antibiotic resistance as a reason to refrain from antibiotic use

Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis
BMJ2010;340:doi: 10.1136/bmj.c2096(Published 18 May 2010)
Cite this as:BMJ2010;340:c2096

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Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis

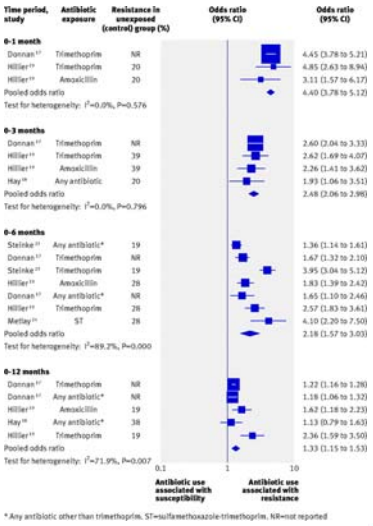

Fig 2 Forest plot showing individual study and pooled ORs (log scale) for resistance in urinary tract bacteria (E coli) and antibiotic exposure.

BMJ

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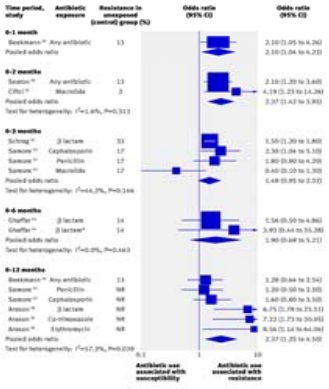
Fig 3 Forest plot showing individual study and pooled ORs (log scale) for resistance in respiratory tract bacteria and previous antibiotic prescribing.



Costelloe C et al. BMJ 2010;340:bmj.c2096

BMJ

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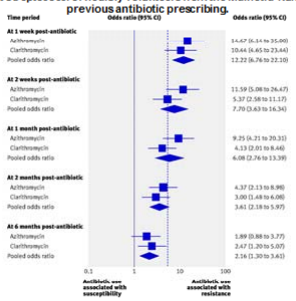
Fig 4 Forest plot showing individual analytic and pooled ORs (log scale) for resistance in respiratory tract streptococci of healthy volunteers from the Malhotra-Kumar study35 and previous antibiotic prescribing.



Costelloe C et al. BMJ 2010;340:bmj.c2096

BMJ

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Conclusions:

1. Antibiotics prescribed to an individual in primary care were consistently found to be associated with resistance of urinary and respiratory bacteria to those antibiotics in that individual
2. Antibiotics prescribed in primary care may impact on bacterial resistance in a patient for up to 12 months
3. The greater the number or duration of antibiotic courses prescribed in the previous 12 months, the greater the likelihood that resistant bacteria would be isolated from that patient

Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis
BMJ2010;340doi: 10.1136/bmj.c2096(Published 18 May 2010)
Cite this as:BMJ2010;340:c2096

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2. Secondary/tertiary (Hospital) care

Available data demonstrate that we are not doing a good job of using antibiotics in in-patient settings.

Several studies show that a substantial percentage (up to 50%) of in-patient antibiotic use is either unnecessary or inappropriate.

http://www.journals.uchicago.edu/doi/pdf/10.1086/510393

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Antibiotics are misused in a variety of ways

- Given when they are not needed
- Continued when they are no longer necessary
- Given at the wrong dose
- Broad spectrum agents are used to treat very susceptible bacteria
- The wrong antibiotic is given to treat an infection

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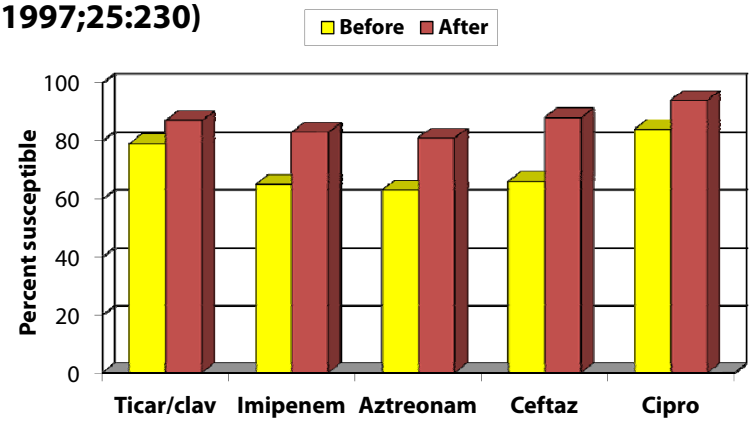
P. aeruginosa susceptibilities before and after implementation of antibiotic restrictions (CID 1997;25:230)



P<0.01 for all increases

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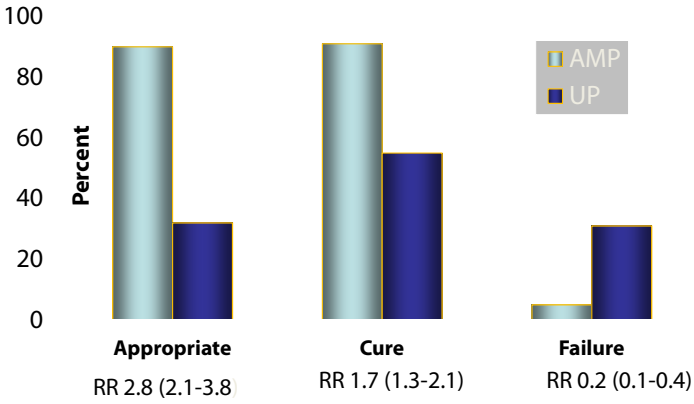
Clinical outcomes better with antimicrobial management program



Fishman N. *Am J Med.* 2006;119:S53.

AMP = Antibiotic Management Program
UP = Usual Practice

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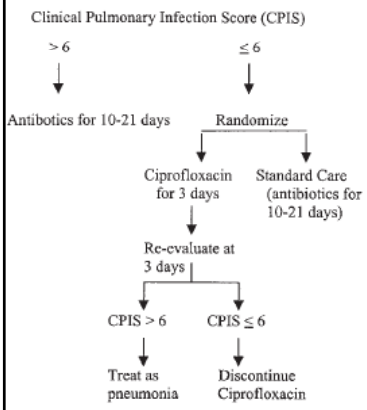
Stewardship optimizes patient safety: decreased patient-level resistance



	Cipro	Standard
Antibiotic duration	3 days	10 days
LOS ICU	9 days	15 days
Antibiotic resistance/ superinfection	14%	38%

Study terminated early because attending physicians began to treat standard care group with 3 days of therapy

Singh N et al. *Am J Respir Crit Care Med.* 2000;162:505-11.

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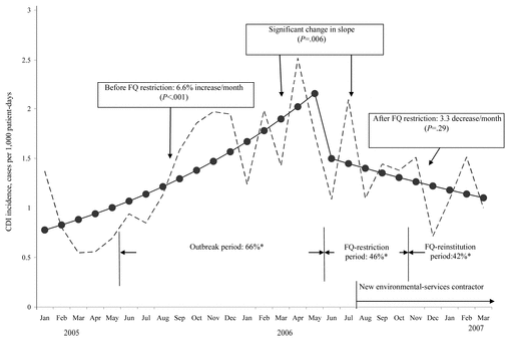

Complete Restriction of Fluoroquinolone Use to Control an Outbreak of *Clostridium difficile* Infection at a Community Hospital
Alexander J. Kallen, MD, MPH; et al

Infection Control and Hospital Epidemiol Vol. 30, No. 3, March 2009

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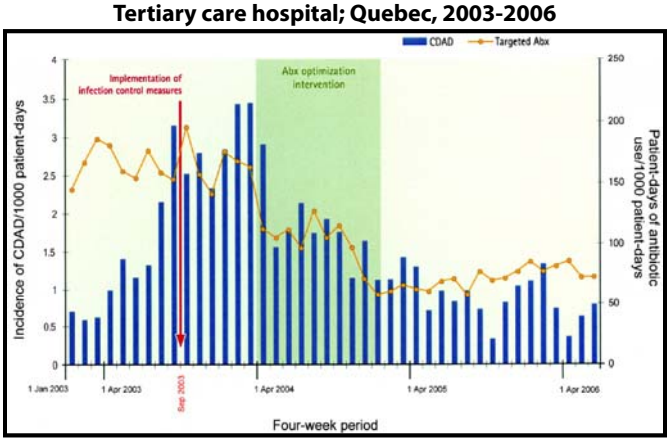
Targeted antibiotic consumption and nosocomial *C. difficile* disease

Tertiary care hospital; Quebec, 2003-2006



Valiquette, et al. *Clin Infect Dis* 2007;45:S112.

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Improving antibiotic use reduces *C. difficile* infections

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Improving antibiotic use is a public health imperative

- Antibiotics are the only drug where use in one patient can impact the effectiveness in another.
- If everyone does not use antibiotics well, we will all suffer the consequences.

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Antibiotic exposure increases the risks of resistance

Pathogen and Antibiotic Exposure	Increased Risk
Carbapenem Resistant Enterobactericeae and Carbapenems	15 fold 1
ESBL producing organisms and Cephalosoprins	6- 29 fold 3,4

- Patel G et al. *Infect Control Hosp Epidemiol* 2008;29:1099-1106
- Zaoutis TE et al. *Pediatrics* 2005;114:942-9
- Talon D et al. *Clin Microbiol Infect* 2000;6:376-84

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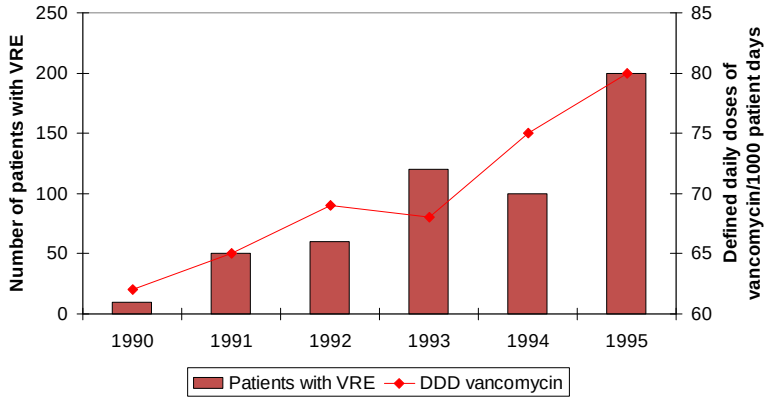
Association of vancomycin use with resistance

(JID 1999;179:163)



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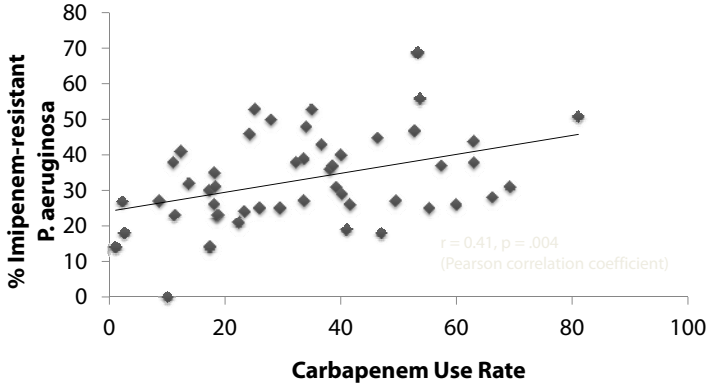
Annual prevalence of imipenem resistance in *P. aeruginosa* vs. carbapenem use rate



45 LTACHs, 2002-03 (59 LTACH years)

Gould et al. ICHE 2006;27:9

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Antibiotic misuse adversely impacts patients - adverse events

USA:

In 2008, there were 142,000 visits to emergency departments for adverse events attributed to antibiotics.

1. Shehab N et al. *Clinical Infectious Diseases* 2008; 15:735-43

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Improving antibiotic use is a public health imperative

- Antibiotics are a shared resource, (and becoming a scarce resource).
- Using antibiotics properly is analogous to developing and maintaining good roads.

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Improving antibiotic use is a public health imperative

- Bringing new antibiotics into our current environment is akin to buying a new car because you hit a pot hole, but doing nothing to fix the road.
- Fixing the "antibiotic use road" is part of the mission of public health.

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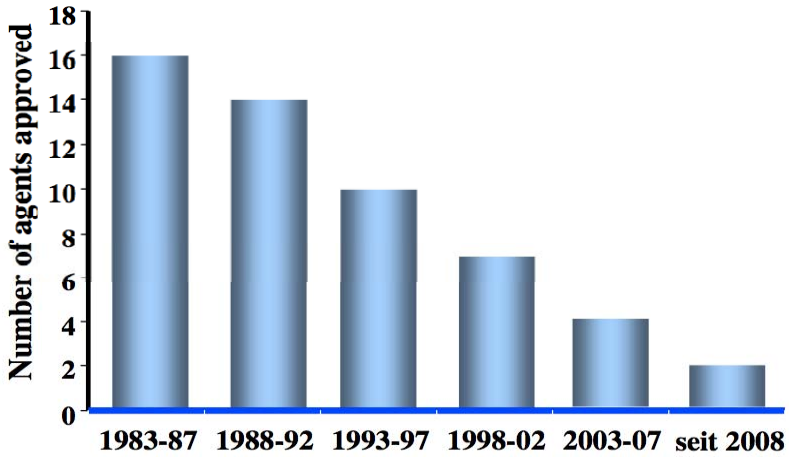
FDA Approval of Antibiotics



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Improving antimicrobial use

Because of their widespread availability and familiarity, generally low cost, and relative safety, antimicrobials are among the most misused of all medicines. Improving antimicrobial use decisions ultimately involves guiding treatment decisions made by patients and healthcare providers.

Increase appropriate use: Ensure that infected patients who need antimicrobial therapy have access to quality medicines which conform with policy recommendations and standard treatment guidelines.

Decrease inappropriate use: Discourage the indisciminate use of antimicrobials in patients unlikely to derive any benefit.

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Examples:

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Wait-and-See Prescription for the Treatment of Acute Otitis Media

A Randomized Controlled Trial

David M. Spiro, MD, MPH
Khoon-Yen Tay, MD
Donald H. Arnold, MD, MPH
James D. Dziura, PhD
Mark D. Baker, MD

Context Acute otitis media (AOM) is the most common diagnosis for which antibiotics are prescribed for children. Previous trials that have evaluated a "wait-and-see prescription" (WASP) for antibiotics, with which parents are asked not to fill the prescription unless the child either is not better or is worse in 48 hours, have excluded children with severe AOM. None of these trials were conducted in an emergency department.

Objectives To determine whether treatment of AOM using a WASP significantly

JAMA, September 13, 2006—Vol 296, No. 10

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Conclusions:

- Use antibiotics „as small as possible“
- Local guidelines should be established according to local situation

- Resistance situation in Mongolia looks good - but further data is needed

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