

The Many Paradoxes of Antibiotic Use



“At least the waiting lists are improving - I only had to wait one week to get MRSA”

**Dr. Ian M. Gould
Medical Microbiology
Aberdeen Royal Infirmary**



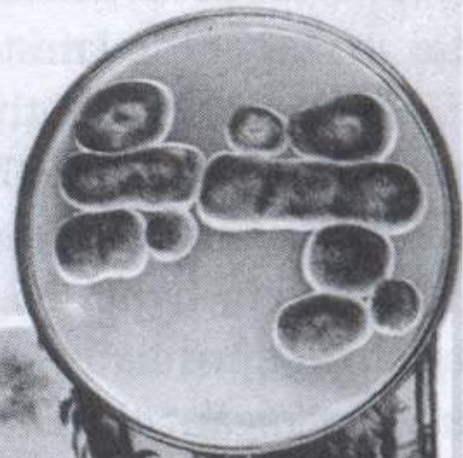
International Society of Chemotherapy

<Infection and Cancer>

www.ischemo.org

Thanks to PENICILLIN

...He Will Come Home!



Paradox 1

- Antibiotics initially led to poorer hospital hygiene



EXTRA EDITION

Evening Express

Wednesday, November 24, 2009

www.eveningexpress.co.uk

NHS chief's shock warning after damning report



**'PATIENTS
COULD DIE
OVER DIRTY
WARD FEARS'**

**EXCLUSIVE:
PAGES 4 & 5**

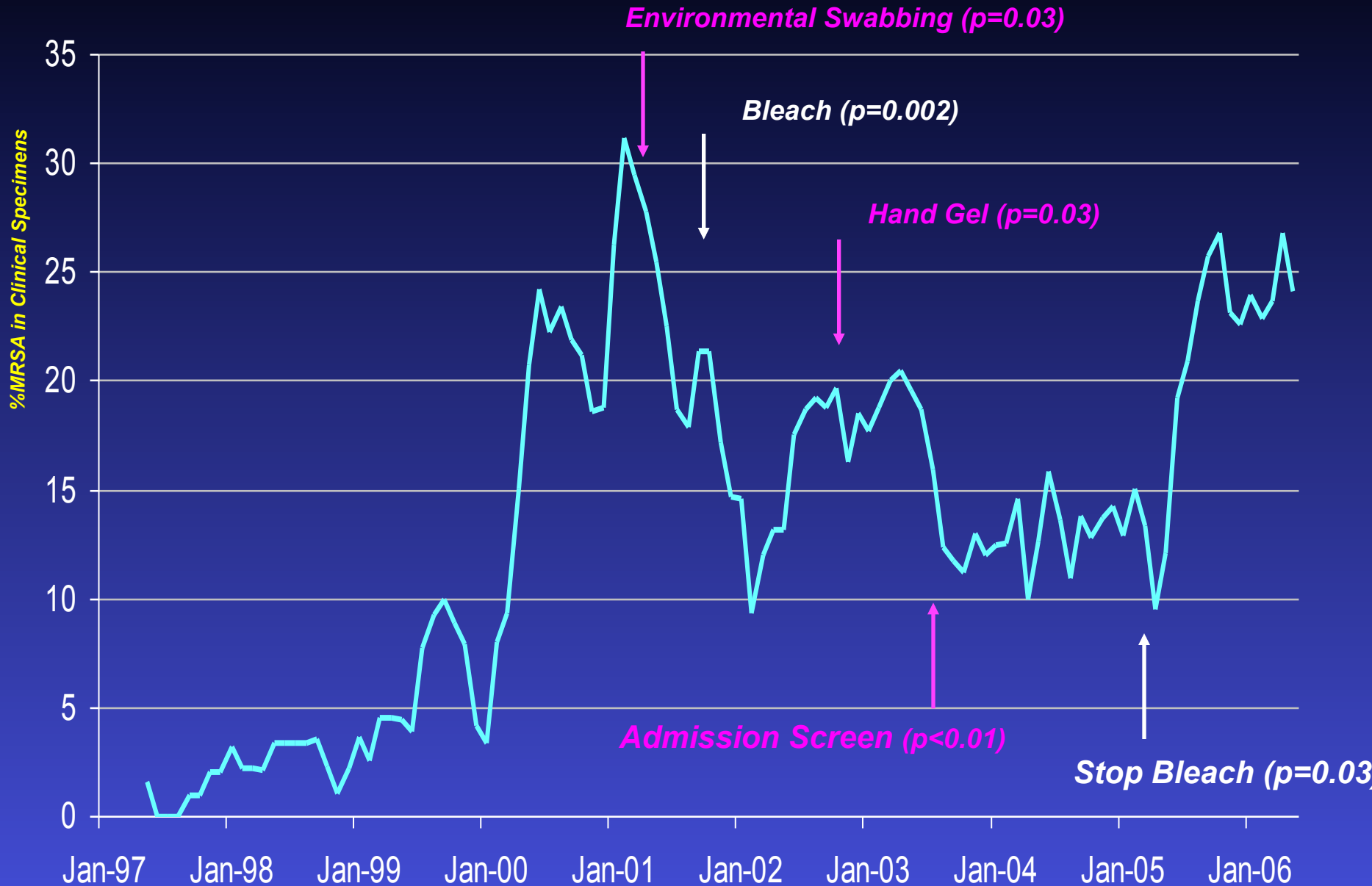
**Healthcare
Environment
Inspectorate
Report**



***“Haven’t you heard
- we’ve got MRSA sweeping the hospital”***

%MRSA in hospital clinical specimens.

Successful Interventions (Mahamat et al IJAA '07, JHI '11)



The
**Antibiotic
Paradox**

How Miracle Drugs Are
Destroying the Miracle

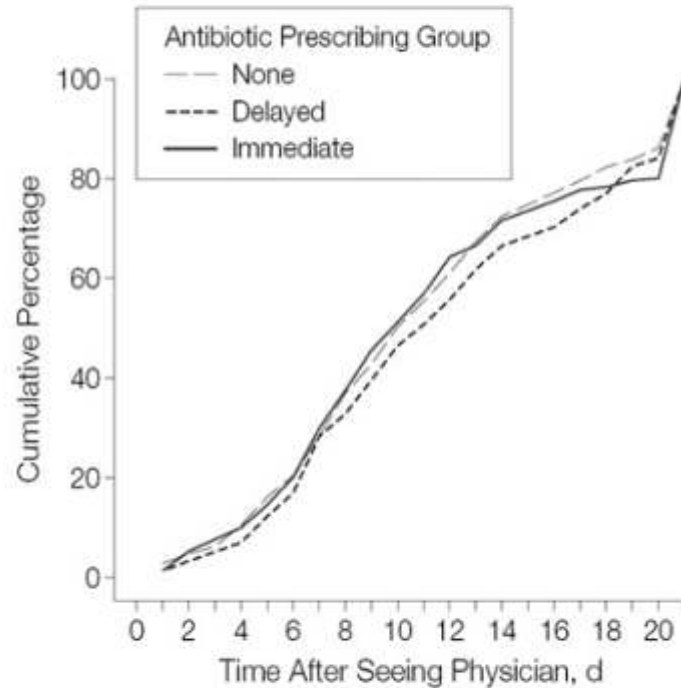
Stuart B. Levy, M.D.

The misuse of a miracle



From the Life Magazine Archives

We have wasted a precious resource by not rendering antibiotics the respect they deserve



Duration of cough after physician visit until patient is feeling better



Environmental contamination

20-50 % antibiotic use in humans not necessary

40-80% antibiotics used for animals questionable value



Paradox 3

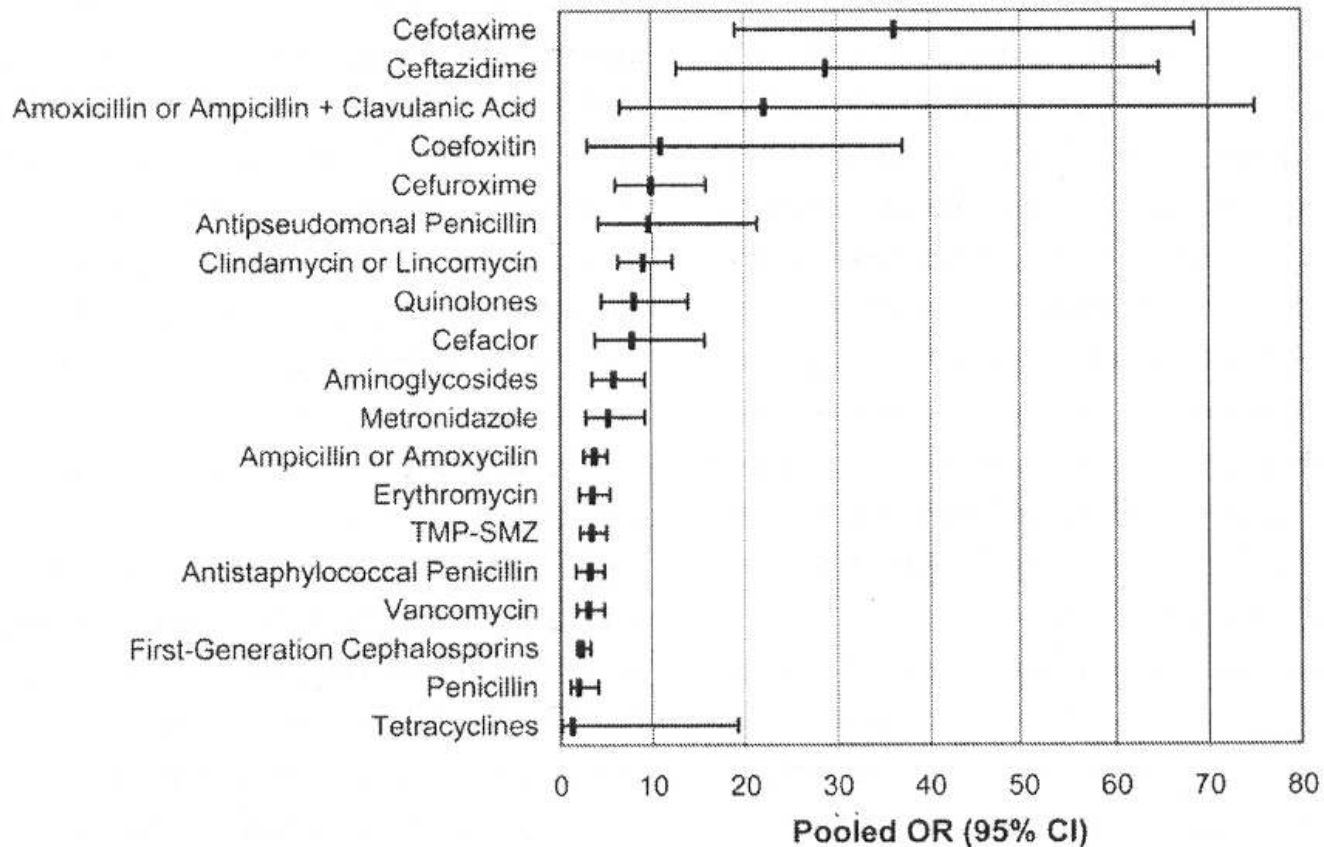
- Antibiotics increase infections

Deaths from HAI, USA

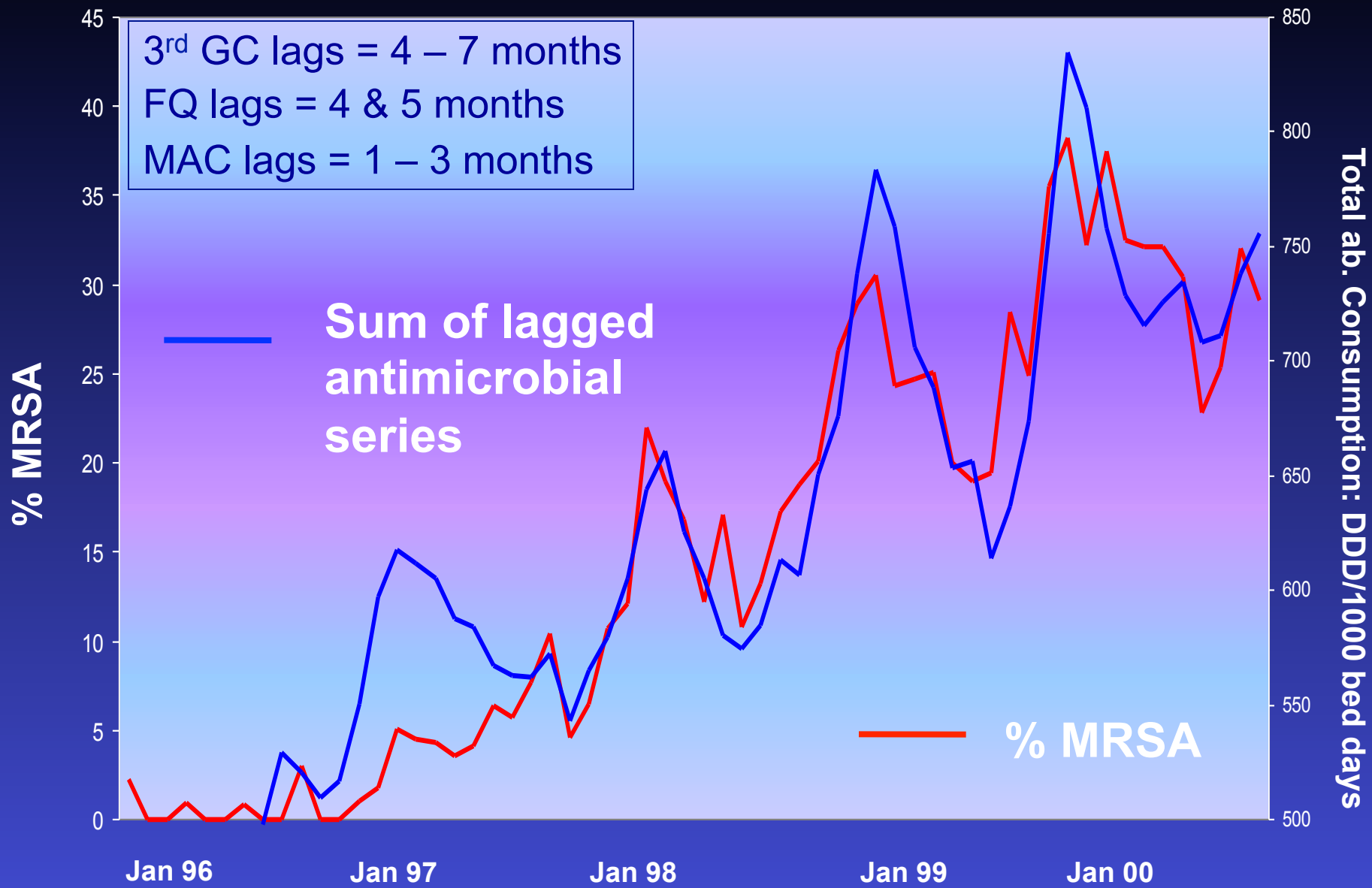
- 1992.....13,300
- 2008..... 100,000

Antibiotics and Resistance,(IDSA website/
Researchandmarket.com)

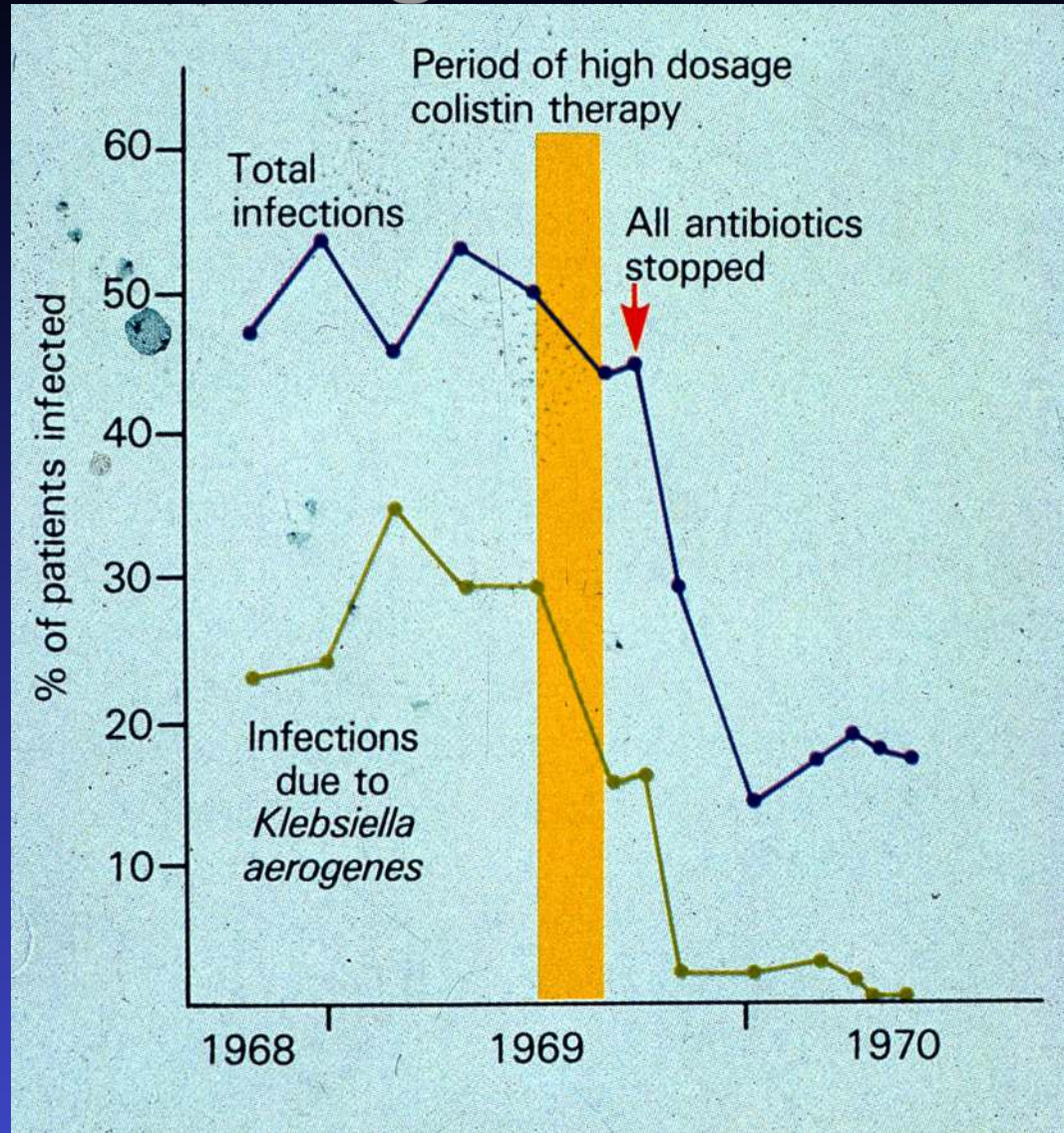
MA of Risk of C diff v Antibiotic Exposure



Relationship between % MRSA and antibiotic use. (3rd GC, FQ, MAC)

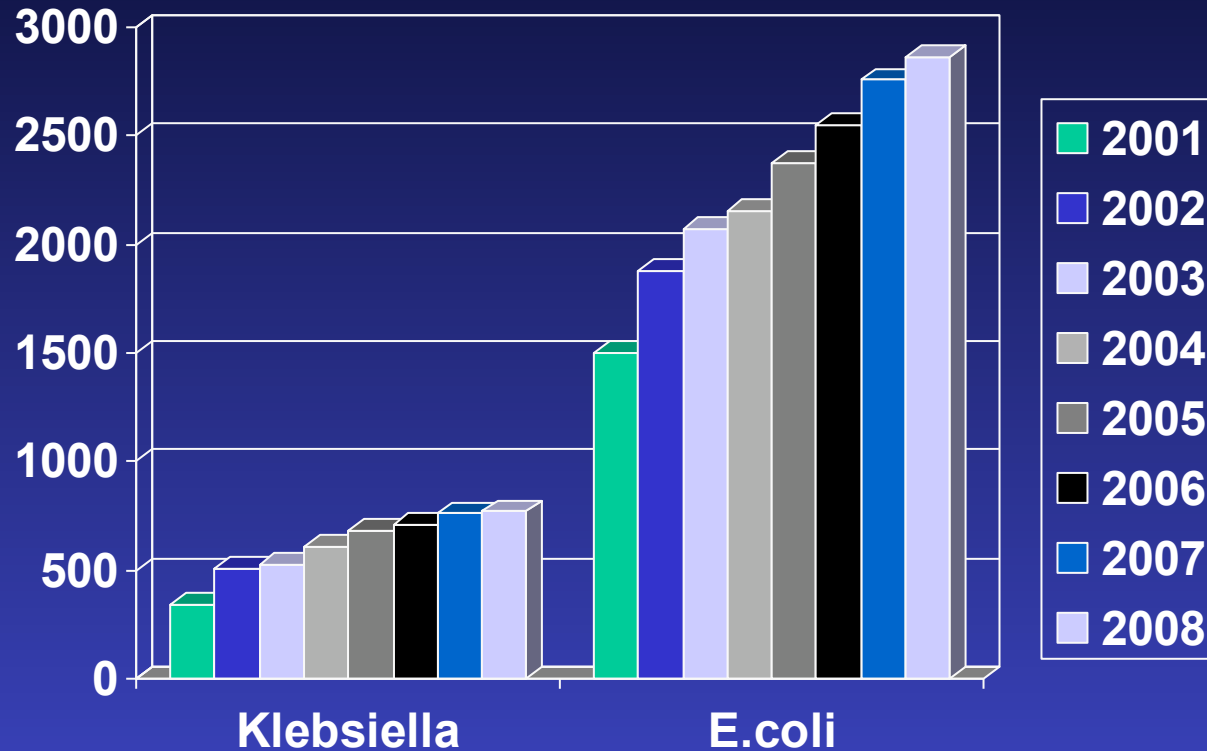


MDR *K. aerogenes* outbreak



Price and Sleight Lancet 1971

HPS Reported bacteraemia



Paradox 4

Antibiotics can
increase severity of
infection

Staphylococcal toxic shock syndrome



Taylor et al, BMJ, 2006

Causes of Increased Transmission, Adherence and Pathogenicity of MRSA when exposed to Antibiotics

- Biofilm formation
- Small colony variants
- Efflux
- Hypermutation
- Skin/RT colonization → transmissibility
- Fibrinectin-binding protein
- Toxin production eg α , TSST-1
- SOS response → horizontal gene transfer
- Phage induction
- Quorum sensing
- agr expression
- Autolysis
- Intracellular persistence

Dancer JAC '08 61 246

Gould JAC'08 61 763



A Reasonable Biological Model?

(adapt. from Monnet D, 2006)

Poor infection control
MRSA colonization pressure
MRSA in the environment
Length of stay, medical devices
Antimicrobial consumption

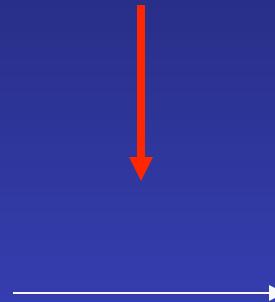
Exposure to fluoroquinolones,
 β -lactams - selection,
increased adhesion, increased
virulence, patient risk factors,
etc.



MRSA negative



Colonized



Infected



New Bugs, not so new drugs

YOU LITTLE BASTARD.

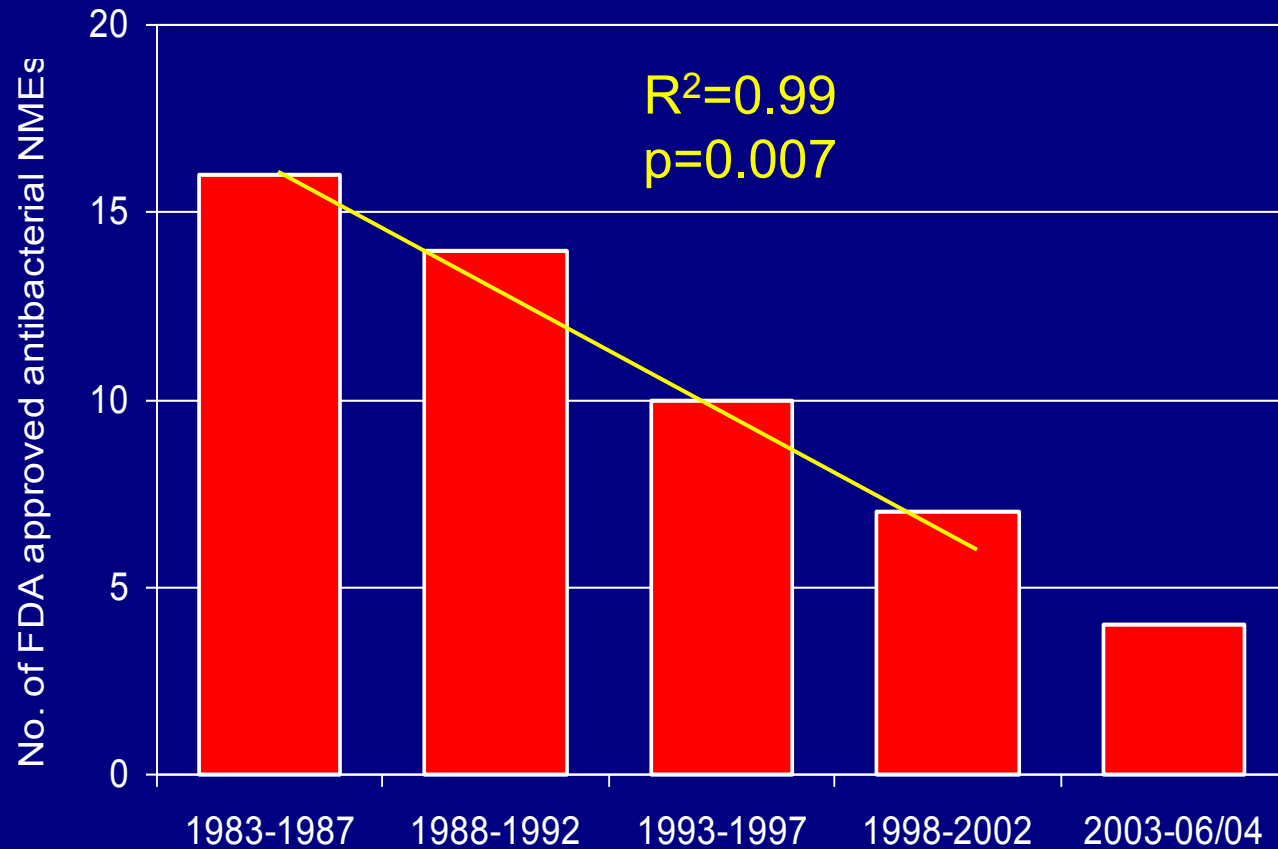


YOU'VE KILLED US ALL.

Paradox 5

No new antibiotics

Antibacterial New Molecular Entities (NMEs) Approved by the FDA for Use in the United States, 1983-June 2004 (topical drugs excluded)



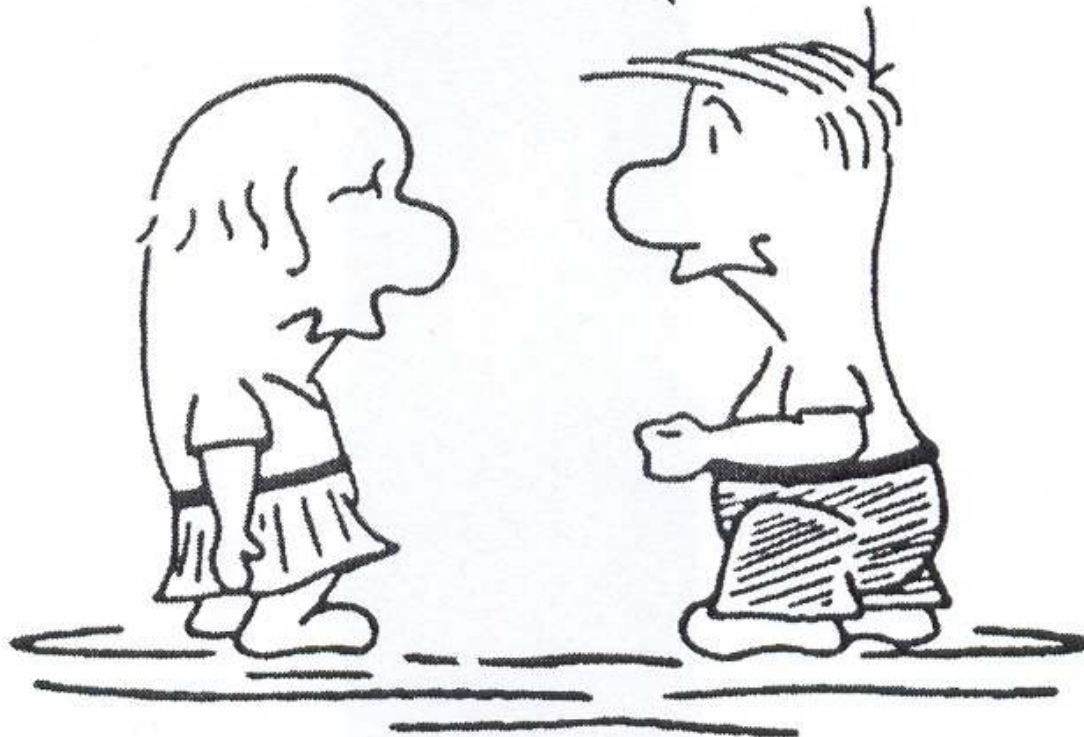
Adapted from: Nordberg P, et al. Antibacterial drug resistance [background paper].

Priority Medicines for Europe and the World, 2004

Paradox 6

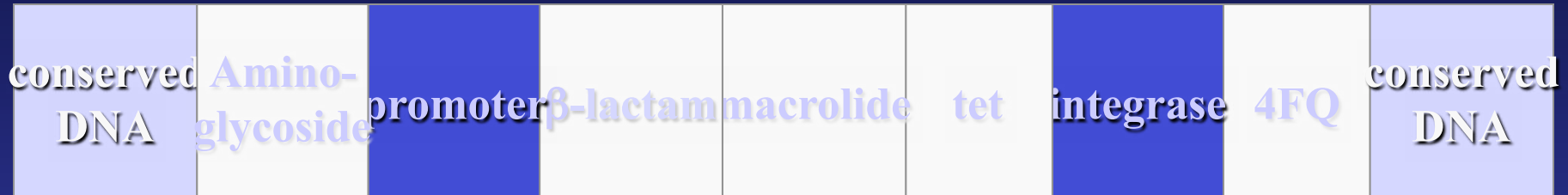
- Are new antibiotics really the answer? (can we ever win the war?)

Ever heard about
conjugation, honey?



«La conjugaison, tu connais?»

Integron



**MULTIPLE ANTIBIOTIC RESISTANT
DETERMINANT**

GENE CASSETTES

Paradox 7

- Generics and Counterfeits





FREE ORAL ANTIBIOTICS



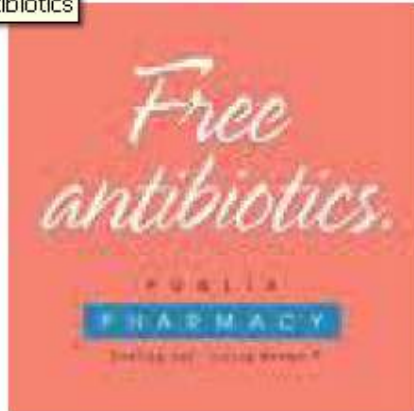
FREE ORAL ANTIBIOTICS

IS THIS HOW SOCIETY VALUES ITS ANTIBIOTICS?

Now the Public Pharmacy makes it even better.
Just bring your prescription for oral antibiotics
to any of our 1,000+ Public Pharmacy
locations and we'll supply you with a 14-day supply.
We'll also provide you with the following:

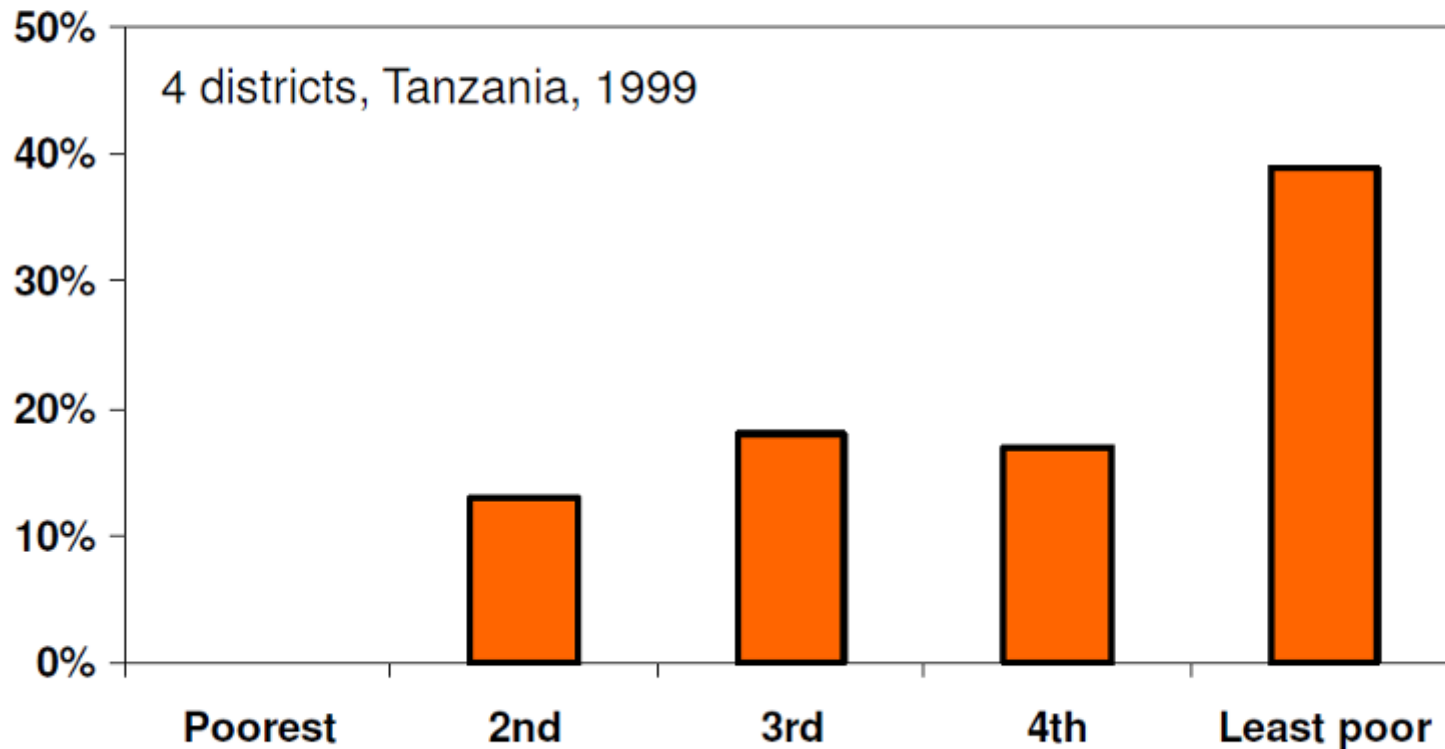
- Sulfamethoxazole/Trimethoprim (SMZ-TMP)
- Ciprofloxacin (excluding ciprofloxacin XR)
- Penicillin VK
- Ampicillin
- Erythromycin Stearate and Ethylsuccinate
- Doxycycline hyclate (capsules only)

free-oral-antibiotics



PUBLIC
PHARMACY
Feeling well. Living better.®

Antibiotics for pneumonia among children under 5 years according to wealth quintiles



Schellenberg JA et al., Lancet 2003;







Ian M. Gould
Jos W.M. van der Meer
Editors

Antibiotic Policies

Controlling Hospital Acquired Infection

 Springer

