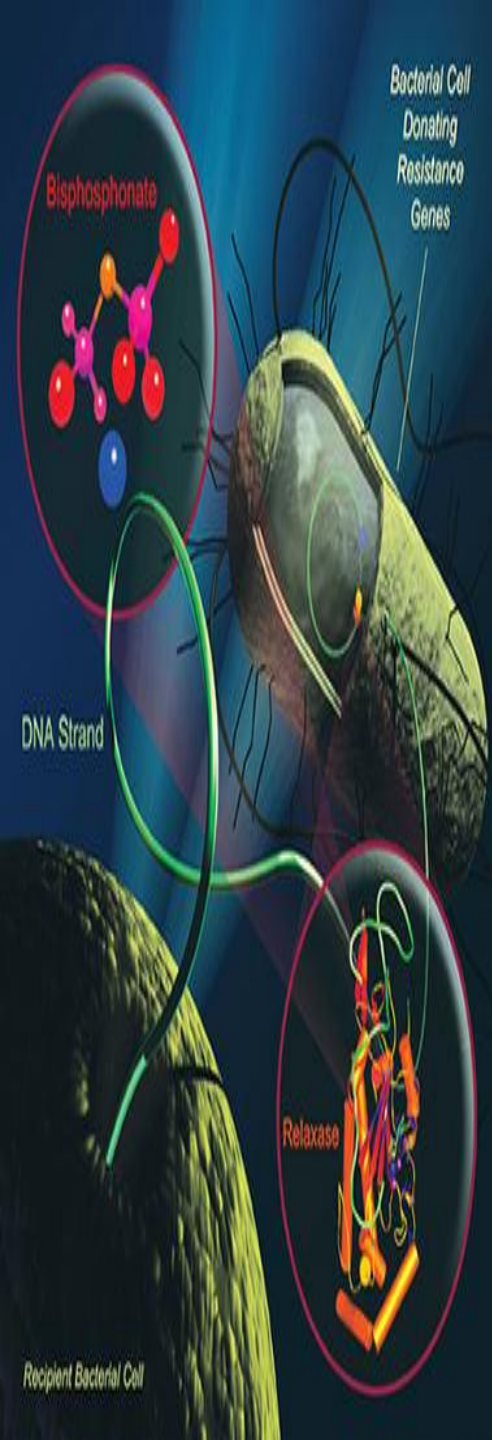


الحمد لله
الذي هدانا لهذا
الذي كنا لنهتدي لولا
أن هدانا الله

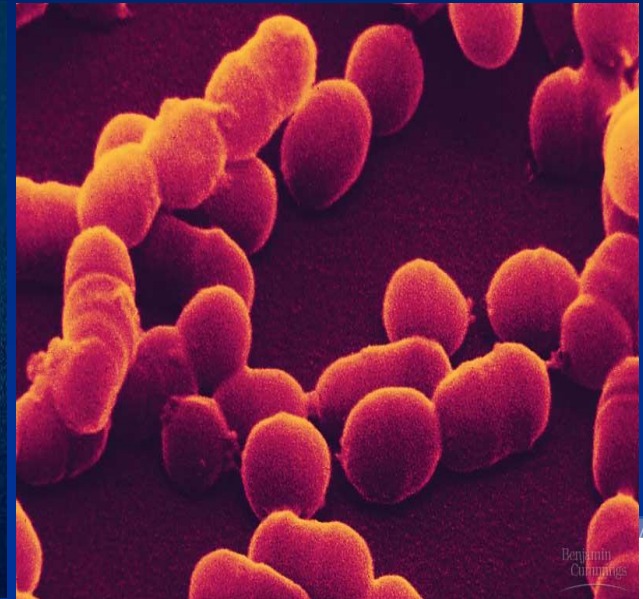
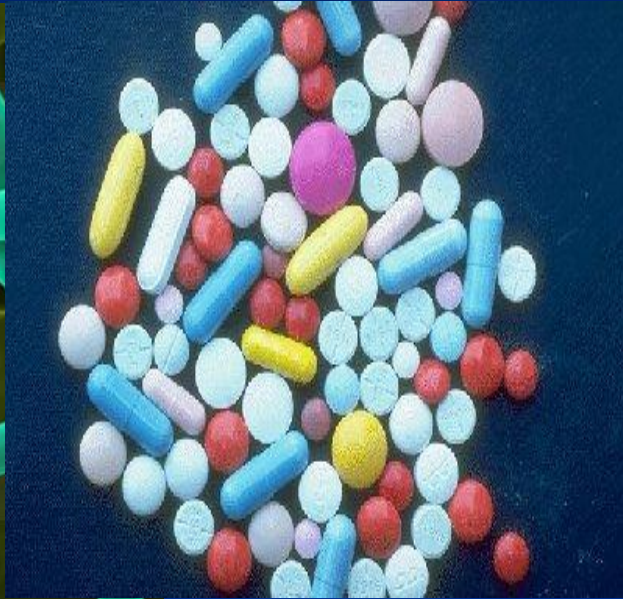




Antibacterial Resistant

DR.BEHROUZ NAGHILI

Bad Bugs ,No Drugs



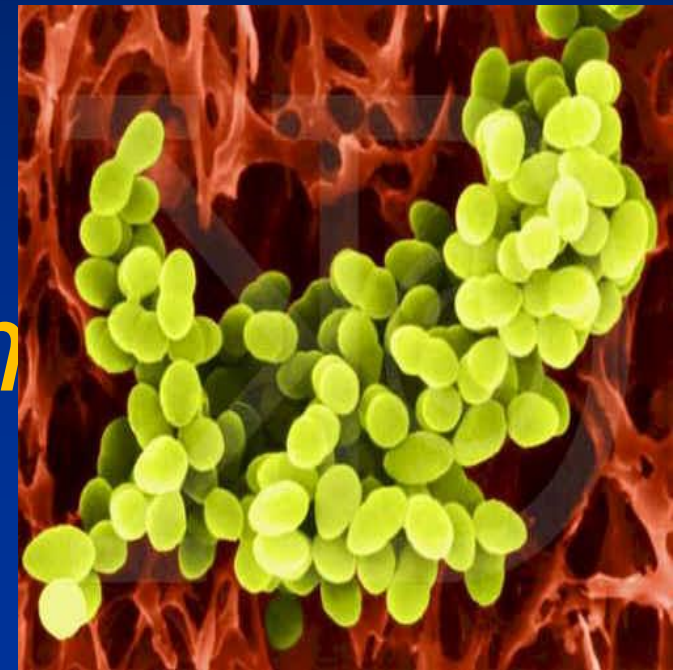
Bad bugs ,No drugs



-We are in the midst of an emerging crisis of antibiotic resistance for microbial pathogens throughout the world

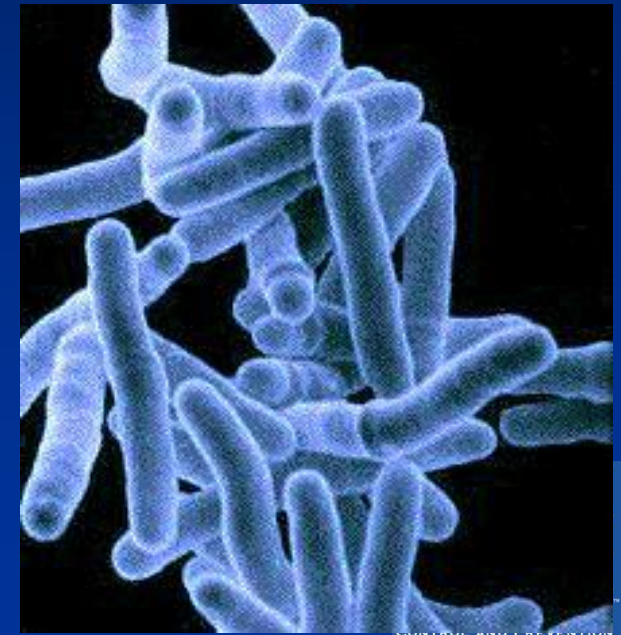
Bad bugs ,No drugs

*-Global pandemic of
methicillin resistance
Staphylococcus infection*



Bad bugs ,No drugs

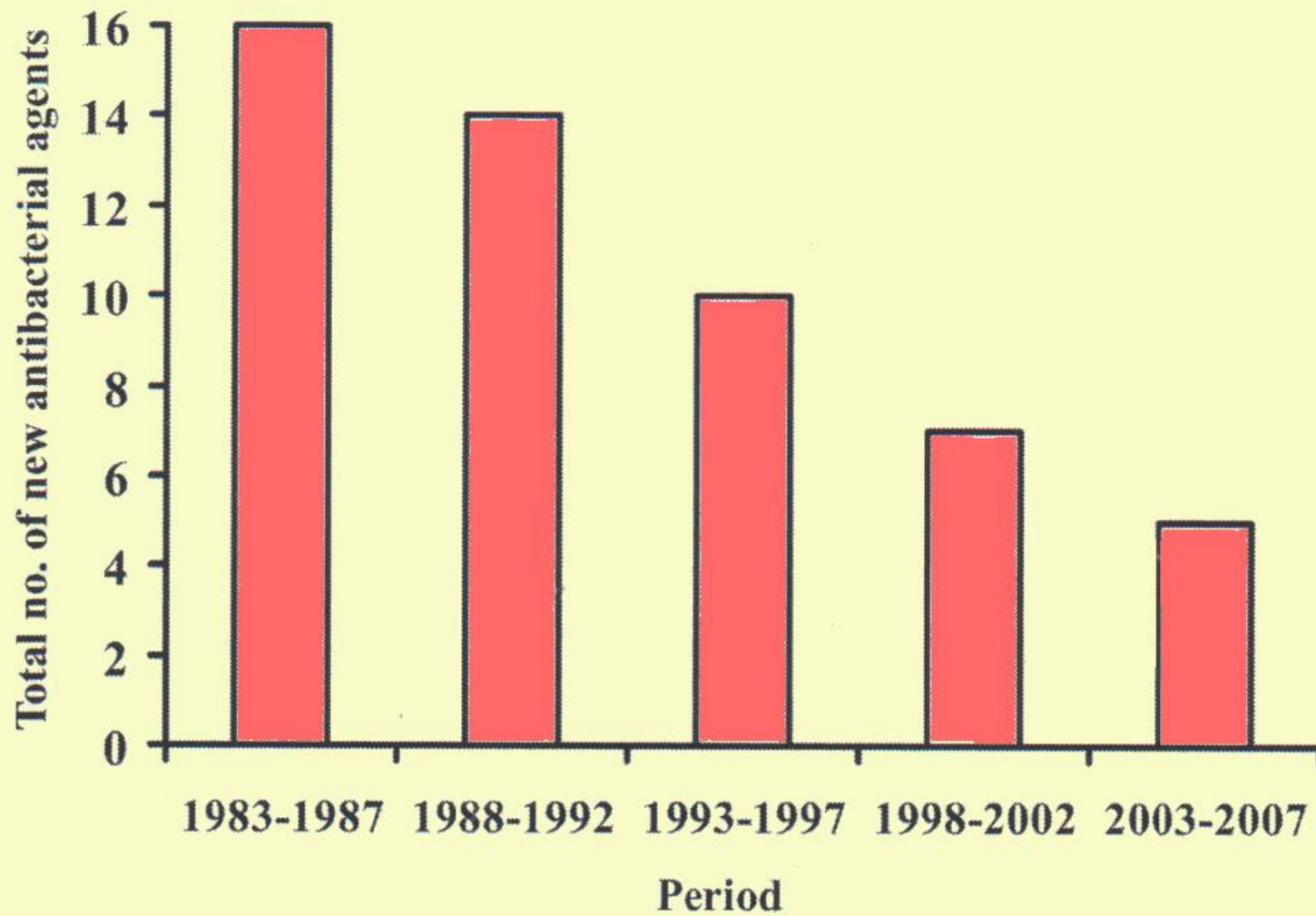
-The global spread of drug resistance among common respiratory pathogens (st.pneumoniae, Mycobacterium tuberculosis)



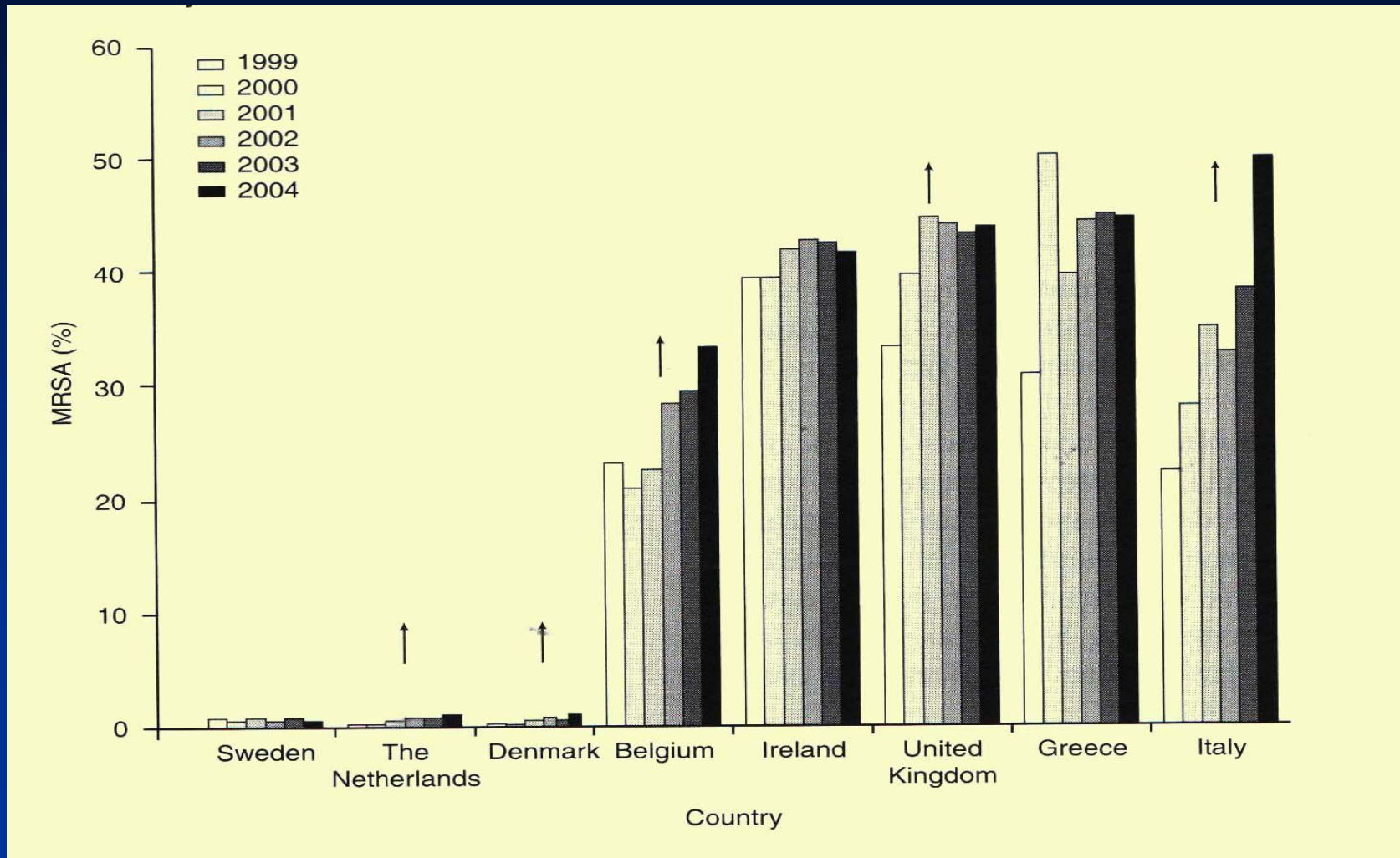
Bad bugs ,No drugs

*-Epidemic increases in
Multidrug resistant
gram-negative bacilli
(pan-resistant)*



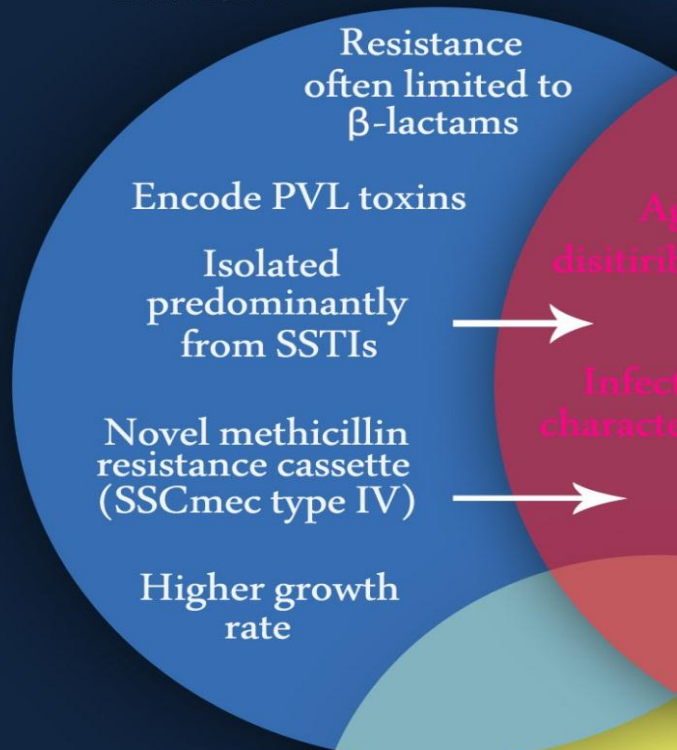


Prevalence of MRSA in eight European countries from 1999 to 2004



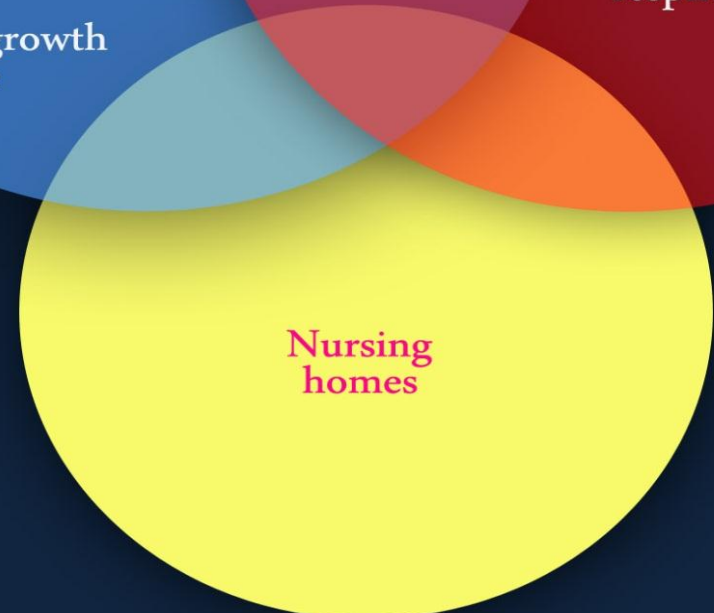
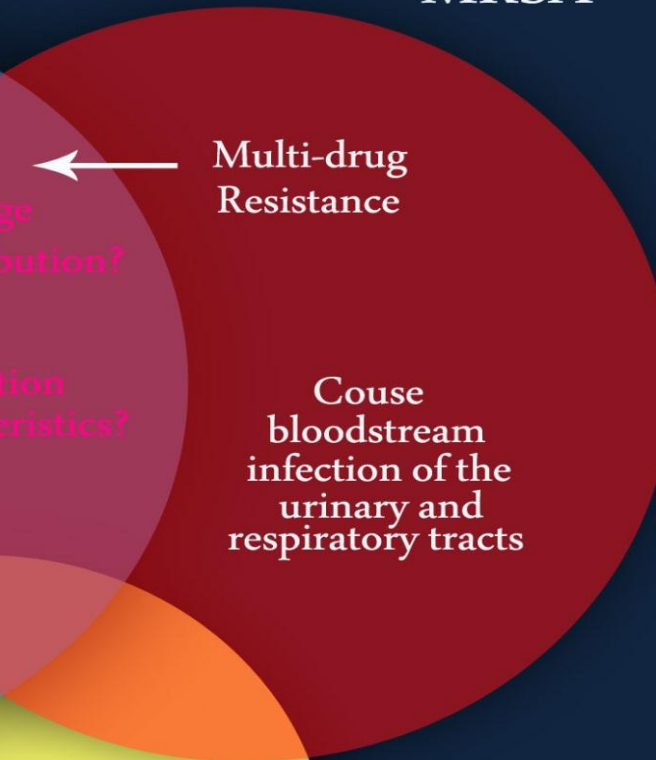
Community-acquired

MRSA



Hospital-acquired

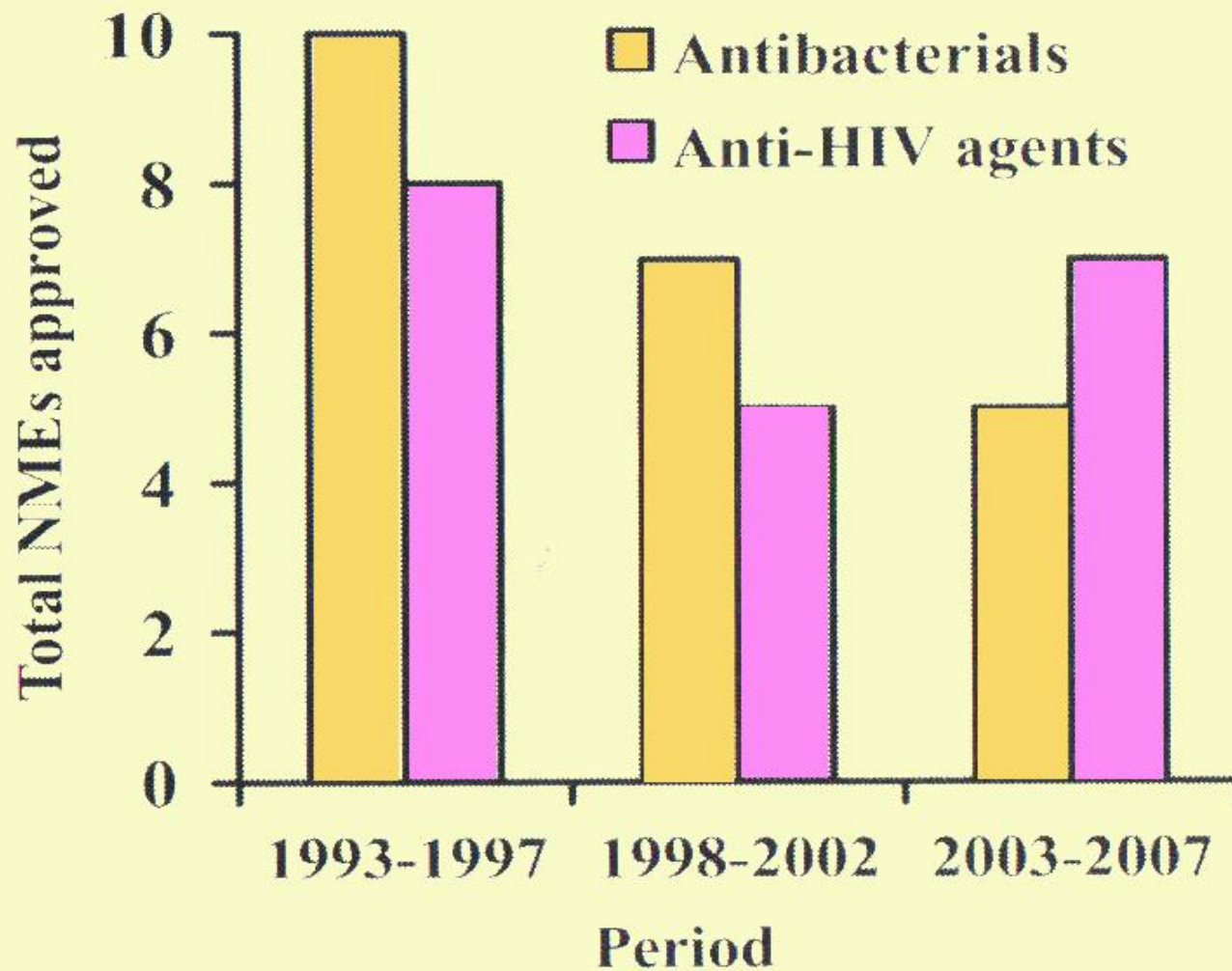
MRSA



Age distribution?

Infection characteristics?

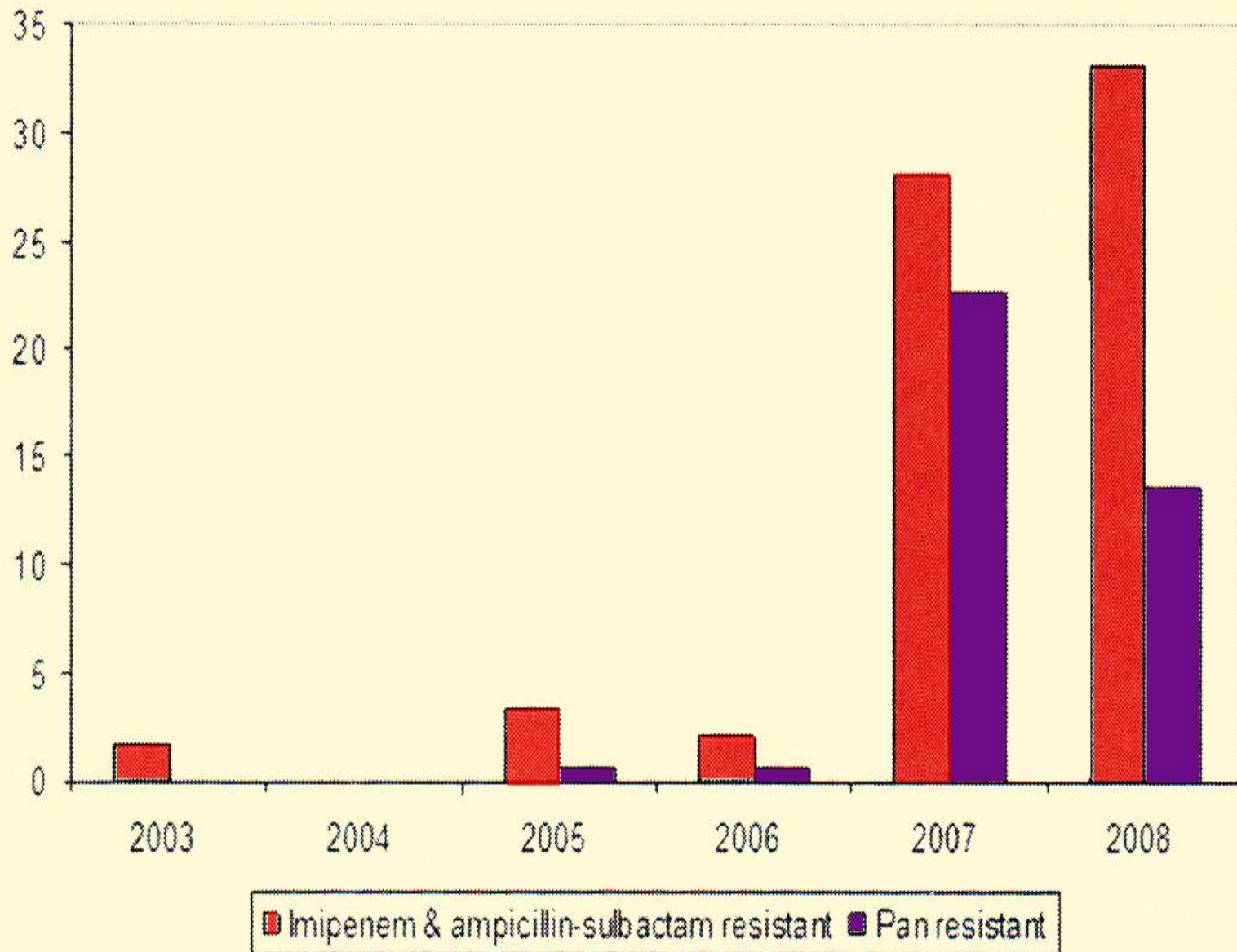




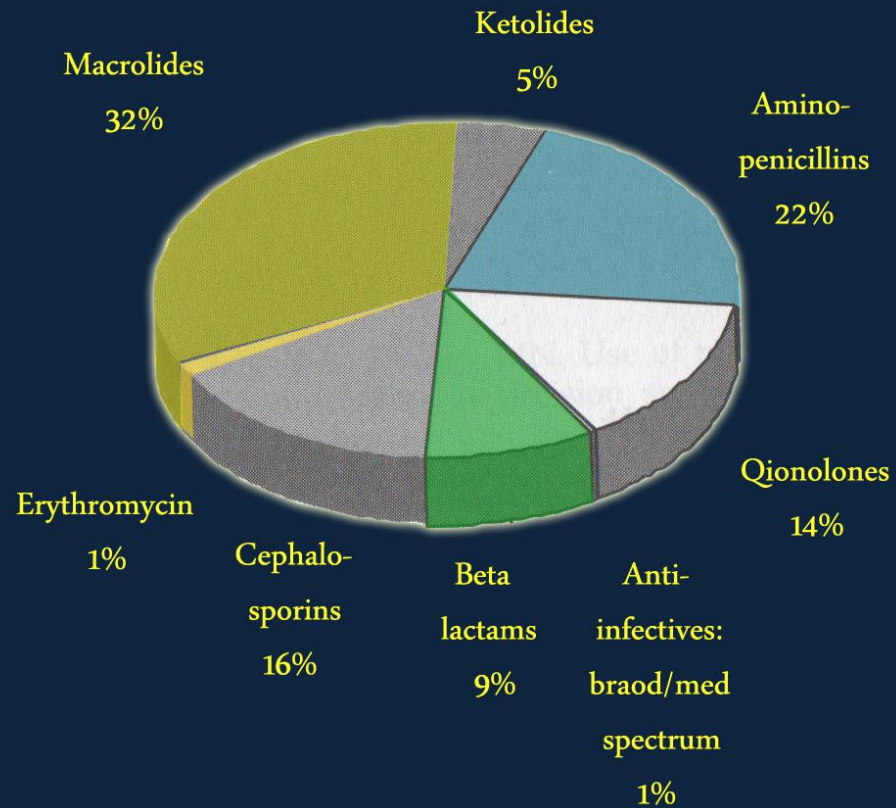
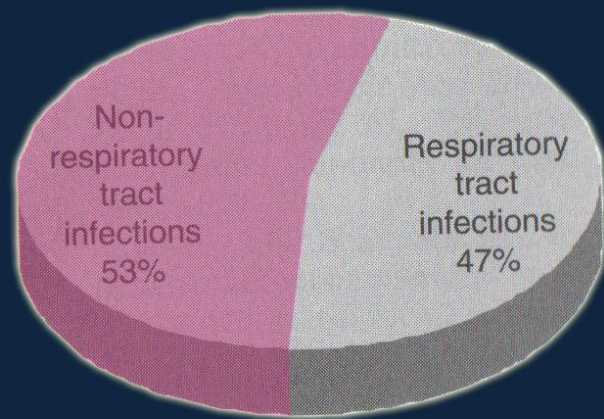
Acinetobacter species

U.S. Military experience





Antibiotic prescriptions, United States 2005



New antibacterial agents approved in the United States 1983-2005

Drug	Year approved
Rifapentine	1998
Quinupristin/dalfopristin	1999
Moxifloxacin	1999
Gatifloxacin	1999
Linezolid	2000
Cefditoren pivoxil	2001
Ertapenem	2001
Gemifloxacin	2003
Daptomycin	2003
Tigecycline	2005



The IDSA's wish list of strategies to address Antimicrobial Resistant Infections





12 Steps to Prevent Antimicrobial Resistance: Hospitalized Adults

World Health Day 2011

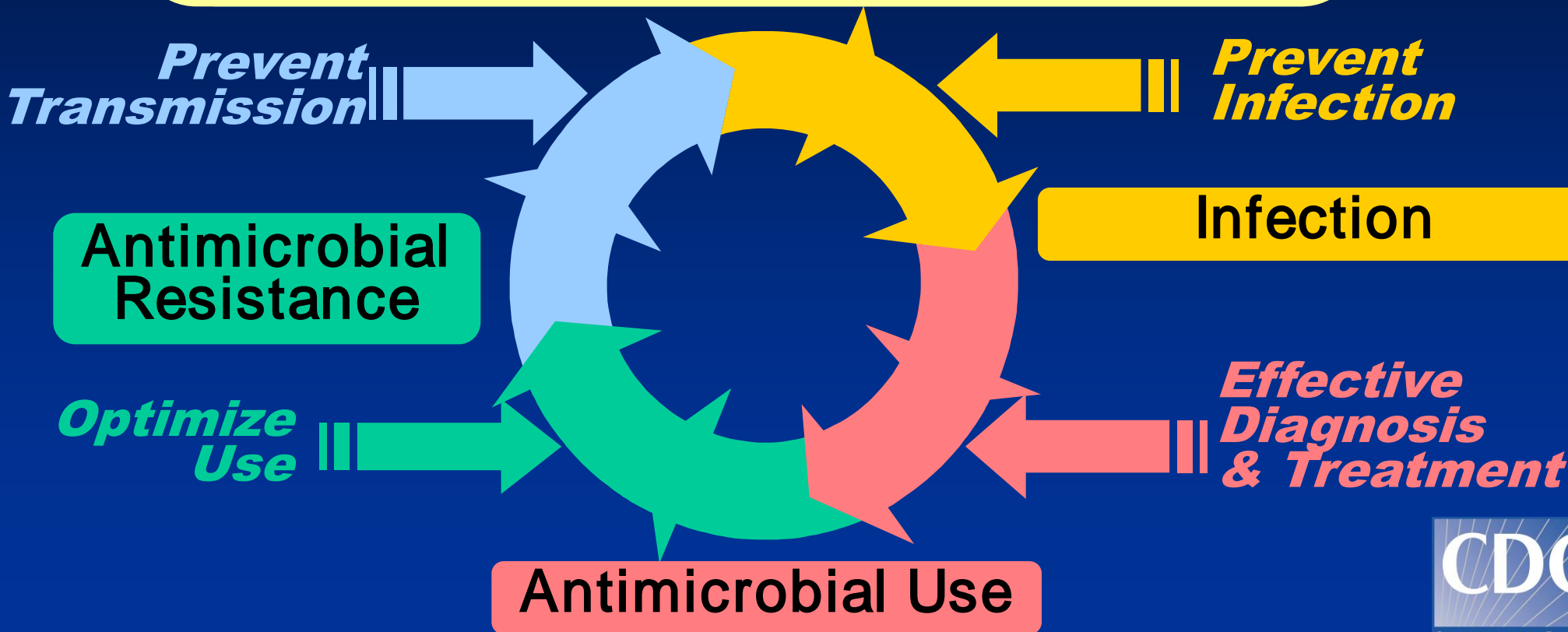
*Antimicrobial Resistance
And Its Global Spread*





Antimicrobial Resistance: Key Prevention Strategies

Susceptible Pathogen

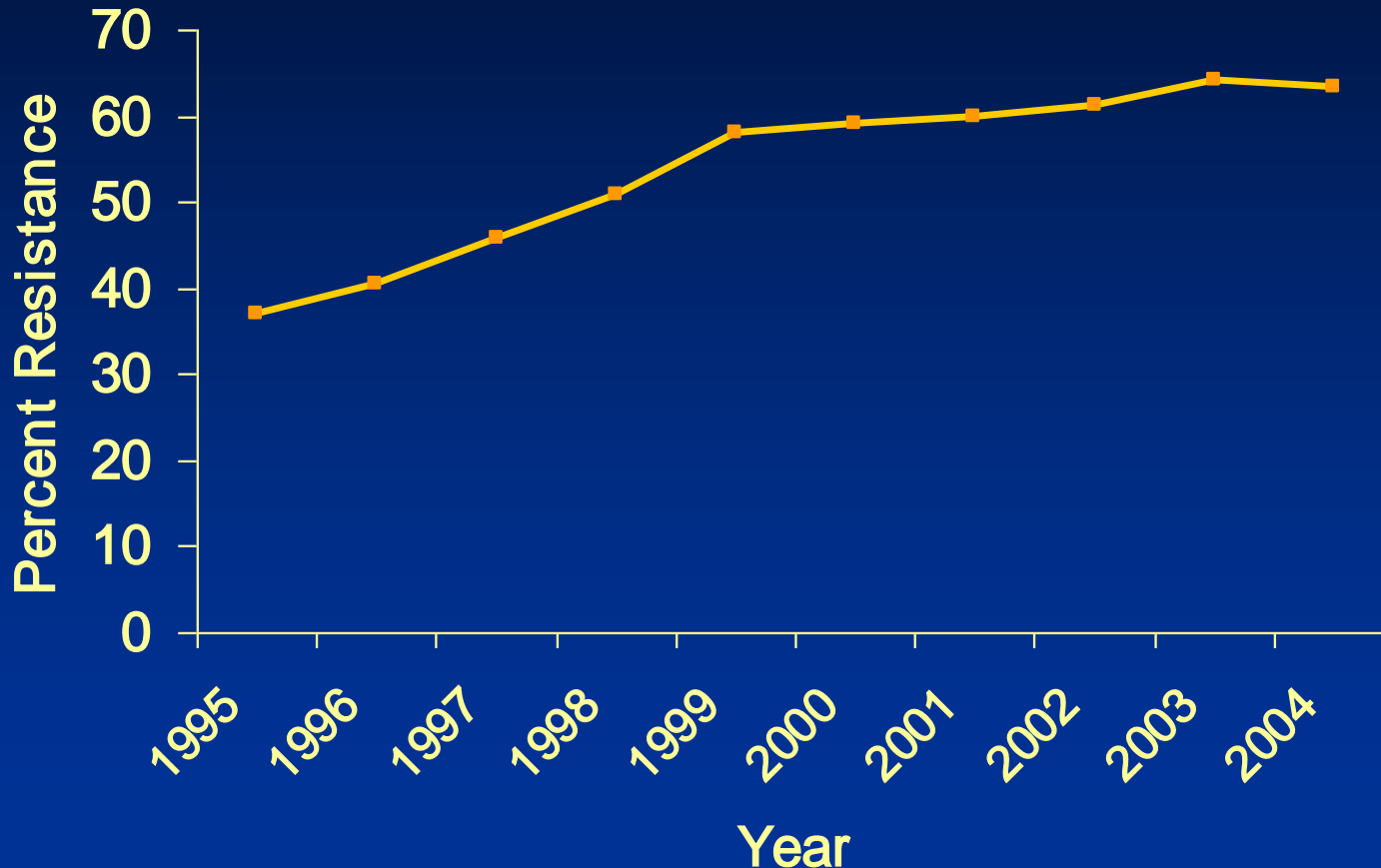


Key Prevention Strategies



- Prevent infection
- Diagnose and treat infection effectively
- Use antimicrobials wisely
- Prevent transmission

Methicillin-Resistant *Staphylococcus aureus* (MRSA) Among Intensive Care Unit Patients, 1995-2004



Source: National Nosocomial Infections Surveillance (NNIS) System

Vancomycin-Resistant *Enterococci* (VRE) Among Intensive Care Unit Patients, 1995-2004



Source: National Nosocomial Infections Surveillance (NNIS) System

➤ [Link to: NNIS Online at CDC](#)

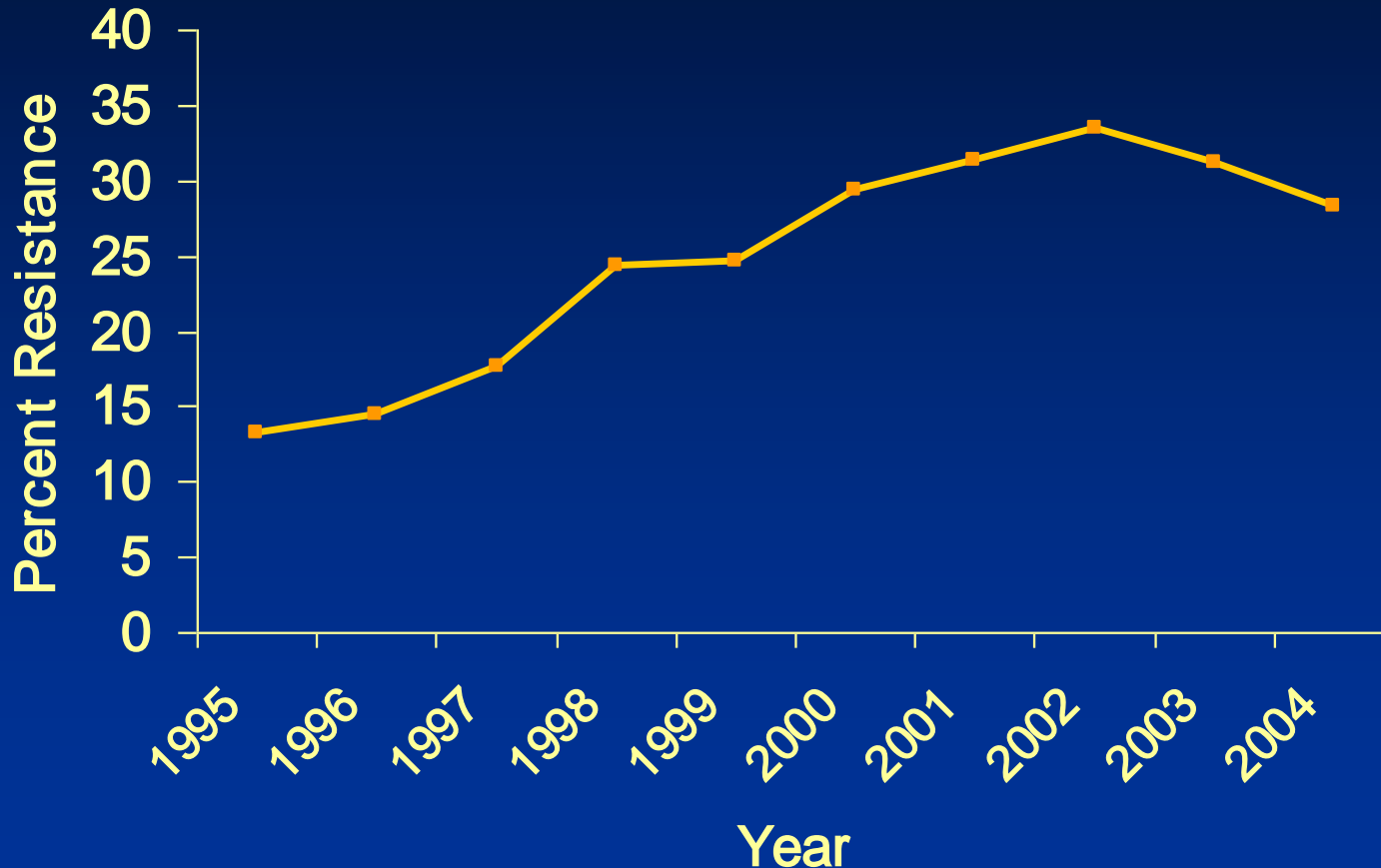
3rd Generation Cephalosporin-Resistant *Klebsiella pneumoniae* Among Intensive Care Unit Patients, 1995-2004



Source: National Nosocomial Infections Surveillance (NNIS) System

➤ [Link to: NNIS Online at CDC](#)

Fluoroquinolone-Resistant *Pseudomonas aeruginosa* Among Intensive Care Unit Patients, 1995-2004



Source: National Nosocomial Infections Surveillance (NNIS) System

➤ [Link to: NNIS Online at CDC](#)

12 Steps to Prevent Antimicrobial Resistance: Hospitalized Adults

Prevent Infection

1. Vaccinate
2. Get the catheters out

Diagnose and Treat Infection Effectively

3. Target the pathogen
4. Access the experts

Use Antimicrobials Wisely

5. Practice antimicrobial control
6. Use local data
7. Treat infection, not contamination
8. Treat infection, not colonization
9. *Know when to say “no” to vanco*
10. Stop treatment when infection is cured or unlikely

Prevent Transmission

11. Isolate the pathogen
12. Break the chain of contagion



Prevent Infection

Step 1: Vaccinate

Fact: Pre-discharge influenza and pneumococcal vaccination of at-risk hospital patients and influenza vaccination of healthcare personnel will prevent infections.

Actions:

- ✓ give influenza / pneumococcal vaccine to at-risk patients before discharge
- ✓ get influenza vaccine annually

- [Link to: ACIP Influenza immunization recommendations](#)
- [Link to: CDC facts about influenza and pneumococcal vaccine](#)
- [Link to: ACIP: Vaccine standing orders](#)



Prevent Infection

Step 2: Get the catheters out

Fact:

Catheters and other invasive devices are the # 1 exogenous cause of hospital-onset infections.



Prevent Infection

Step 2: Get the catheters out

Fact: Catheters and other invasive devices are the # 1 exogenous cause of hospital-onset infections.

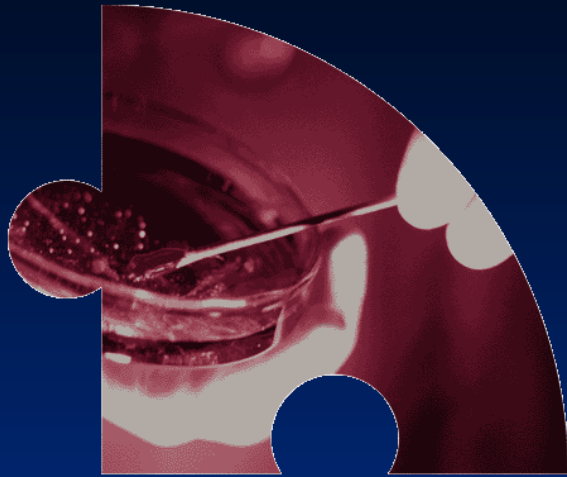
Actions:

- ✓ use catheters only when essential
- ✓ use the correct catheter
- ✓ use proper insertion & catheter-care protocols
- ✓ remove catheters when not essential

➤ Link to: [*New IV Guideline*](#)

➤ Link to: [*Urinary catheter infection prevention*](#)

➤ Link to: [*Guidelines for the Prevention of Intravascular Catheter-related Infections*](#)



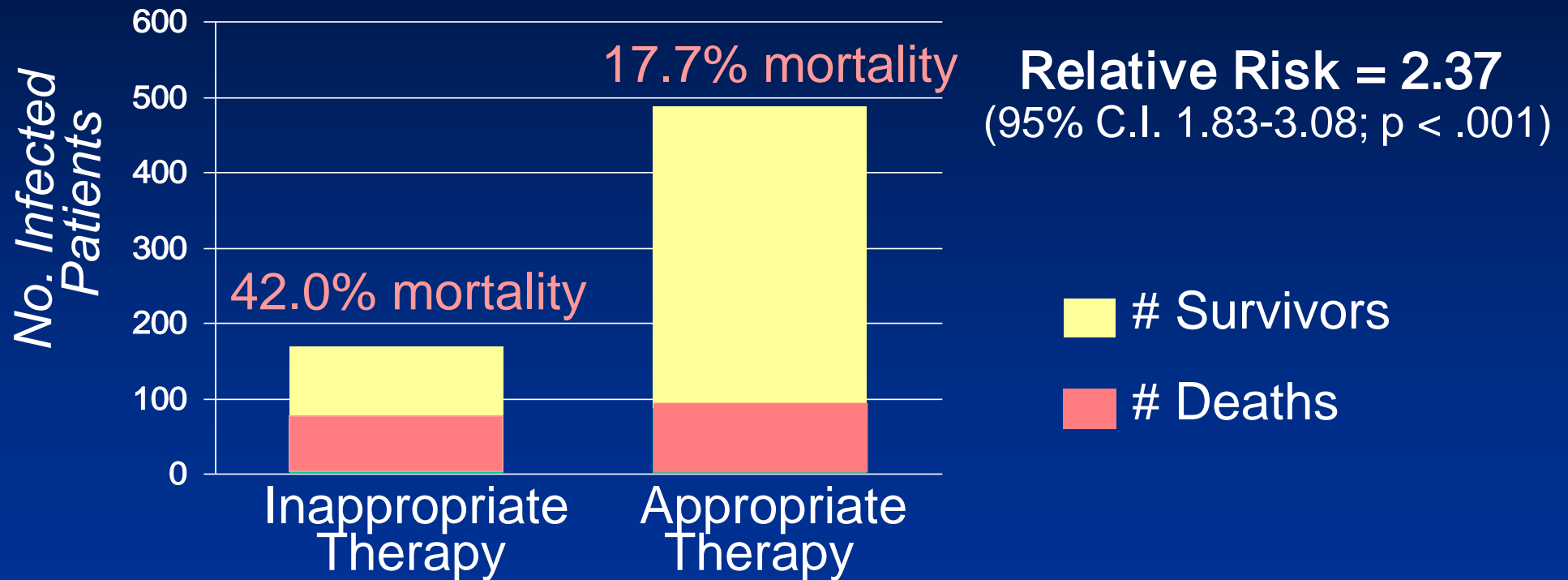
*Diagnose & Treat
Infection Effectively*
Step 3:
Target the pathogen

Fact:

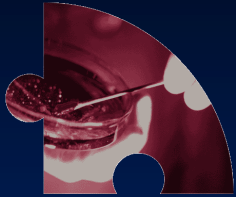
Appropriate antimicrobial therapy (correct regimen, timing, dosage, route, and duration) saves lives.



Inappropriate Antimicrobial Therapy: Impact on Mortality



Source: Kollef M, et al: Chest 1999;115:462-74



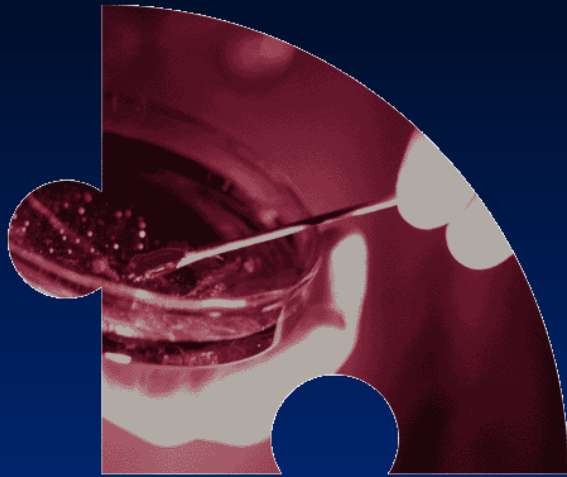
Diagnose & Treat Infection Effectively

Step 3: Target the pathogen

Fact: Appropriate antimicrobial therapy saves lives.

Actions:

- ✓ culture the patient
- ✓ target **empiric therapy** to likely pathogens and local antibiogram
- ✓ target **definitive therapy** to known pathogens and antimicrobial susceptibility test results



Diagnose & Treat Infection Effectively

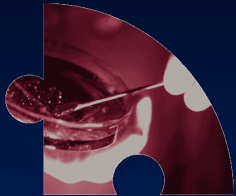
Step 4:

Access the experts

Fact: Infectious diseases expert input improves the outcome of serious infections.

Infectious Diseases Expert Resources





Diagnose & Treat Infection Effectively

Step 4: Access the experts

Fact: Infectious diseases expert input improves the outcome of serious infections.

Action:

- ✓ consult infectious diseases experts about patients with serious infections

➤ [Link to: SHEA / IDSA: Guidelines for the Prevention of Antimicrobial Resistance in Hospitals](#)



Use Antimicrobials Wisely
**Step 5: Practice
antimicrobial control**

Fact: Programs to improve antimicrobial use are effective.

Methods to Improve Antimicrobial Use

- Passive prescriber education
- Standardized antimicrobial order forms
- Formulary restrictions
- Prior approval to start/continue
- Pharmacy substitution or switch
- Multidisciplinary drug utilization evaluation (DUE)
- Interactive prescriber education
- **Provider/unit performance feedback**
- **Computerized decision support/on-line ordering**

➤ [Link to: SHEA / IDSA: Guidelines for the Prevention of Antimicrobial Resistance in Hospitals](#)



Use Antimicrobials Wisely

Step 5: Practice antimicrobial control

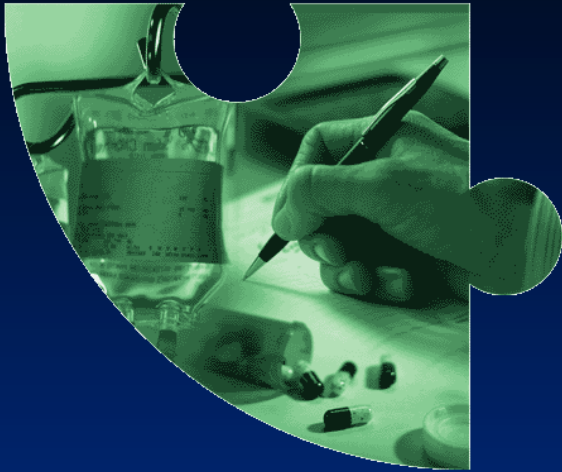
Fact: Programs to improve antimicrobial use are effective.

Action:

- ✓ engage in local antimicrobial use quality improvement efforts

Source: Schiff GD, et al: *Jt Comm J Qual Improv* 2001;27:387-402



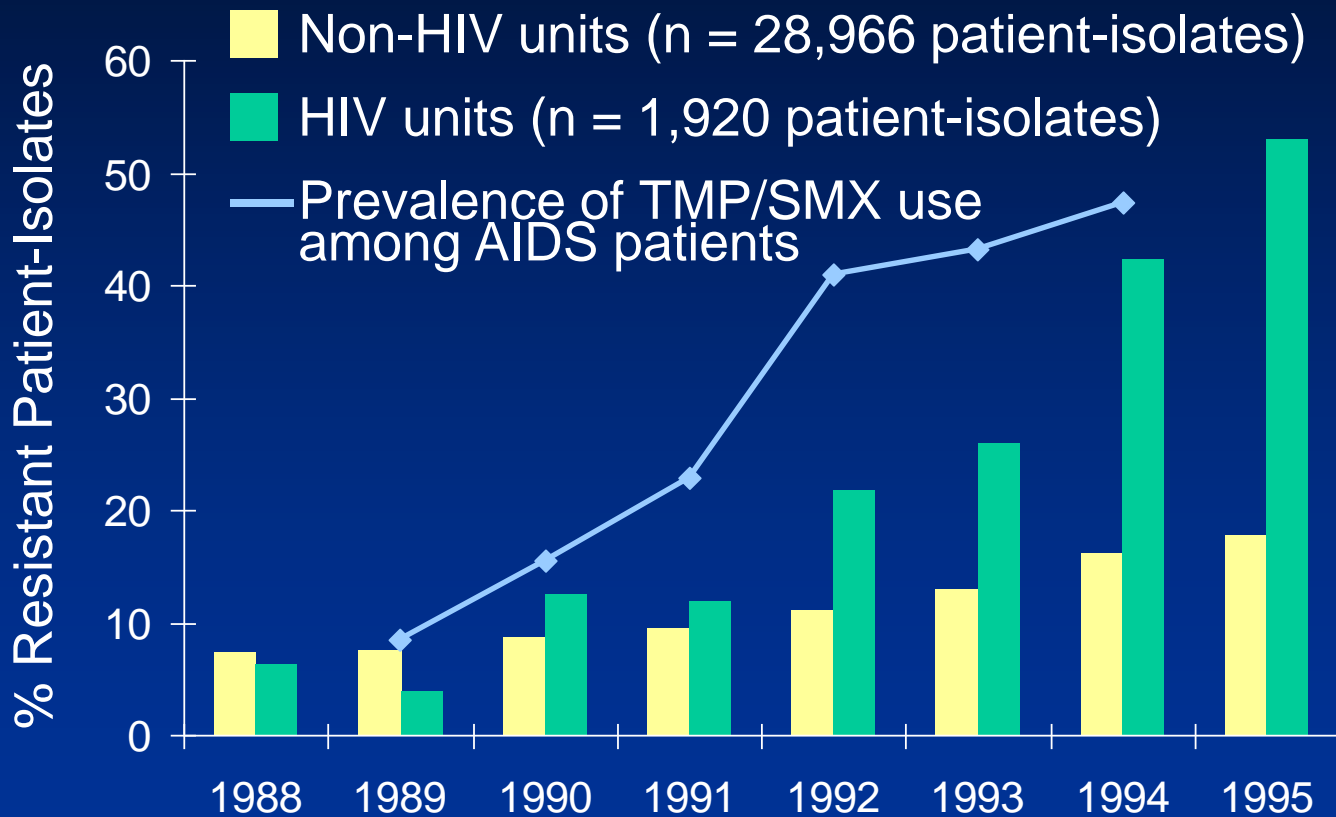


Use Antimicrobials Wisely

Step 6: Use local data

Fact: The prevalence of resistance can vary by time, locale, patient population, hospital unit, and length of stay.

Trimethoprim/sulfamethoxazole (TMP/SMX) Resistance Among Bacterial Patient-Isolates*



San Francisco General Hospital

Martin JN, et al: *J Infect Dis* 1999;180:1809-18

* 30,886 patient-isolates

Staphylococcus aureus

Escherichia coli

Enterobacter spp.

Klebsiella pneumoniae

Morganella spp.

Proteus spp.

Serratia spp.

Citrobacter spp.



Use Antimicrobials Wisely

Step 6: Use local data

Fact: The prevalence of resistance can vary by locale, patient population, hospital unit, and length of stay.

Actions:

- ✓ know your local antibiogram
- ✓ know your patient population



Use Antimicrobials Wisely

Step 7: Treat infection, not contamination

Fact: A major cause of antimicrobial overuse is *“treatment”* of contaminated cultures.

Interpreting a “Positive” Blood Culture

True Bacteremia:

Unlikely

- *Corynebacterium spp.*
- Non-anthraxis *Bacillus spp.*
- *Propionibacterium acnes*

Uncertain

- coagulase-negative staphylococci

Likely

- *S. aureus*
- *S. pneumoniae*
- *Enterobacteriaceae*
- *P. aeruginosa*
- *C. albicans*

pre-test probability
patient risk factors
prosthetic devices
clinical evidence

post-test probability
positive / # cultures
compare antibiograms
compare genotypes

Source: Kim SD, et al: *Infect Control Hosp Epidemiol* 2000;21:213-7



Use Antimicrobials Wisely

Step 7: Treat infection, not contamination

Fact: *A major cause of antimicrobial overuse is “treatment” of contaminated cultures.*

Actions:

- ✓ use proper antisepsis for blood & other cultures
- ✓ culture the blood, not the skin or catheter hub
- ✓ use proper methods to obtain & process all cultures

➤ *Link to: [CAP standards for specimen collection and management](#)*



Use Antimicrobials Wisely
**Step 8: Treat infection,
not colonization**

Fact: A major cause of antimicrobial overuse is *“treatment”* of colonization.



Use Antimicrobials Wisely

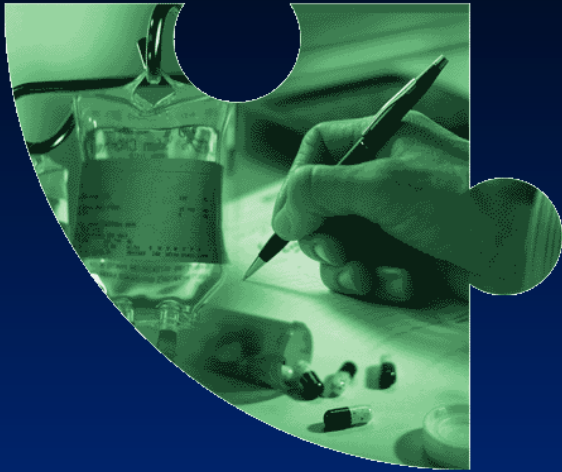
Step 8: Treat infection, not colonization

Fact: A major cause of antimicrobial overuse is treatment of colonization.

Actions:

- ✓ treat pneumonia, not the tracheal aspirate
- ✓ treat bacteremia, not the catheter tip or hub
- ✓ treat urinary tract infection, not the indwelling catheter

➤ [Link to: IDSA guideline for evaluating fever in critically ill adults](#)

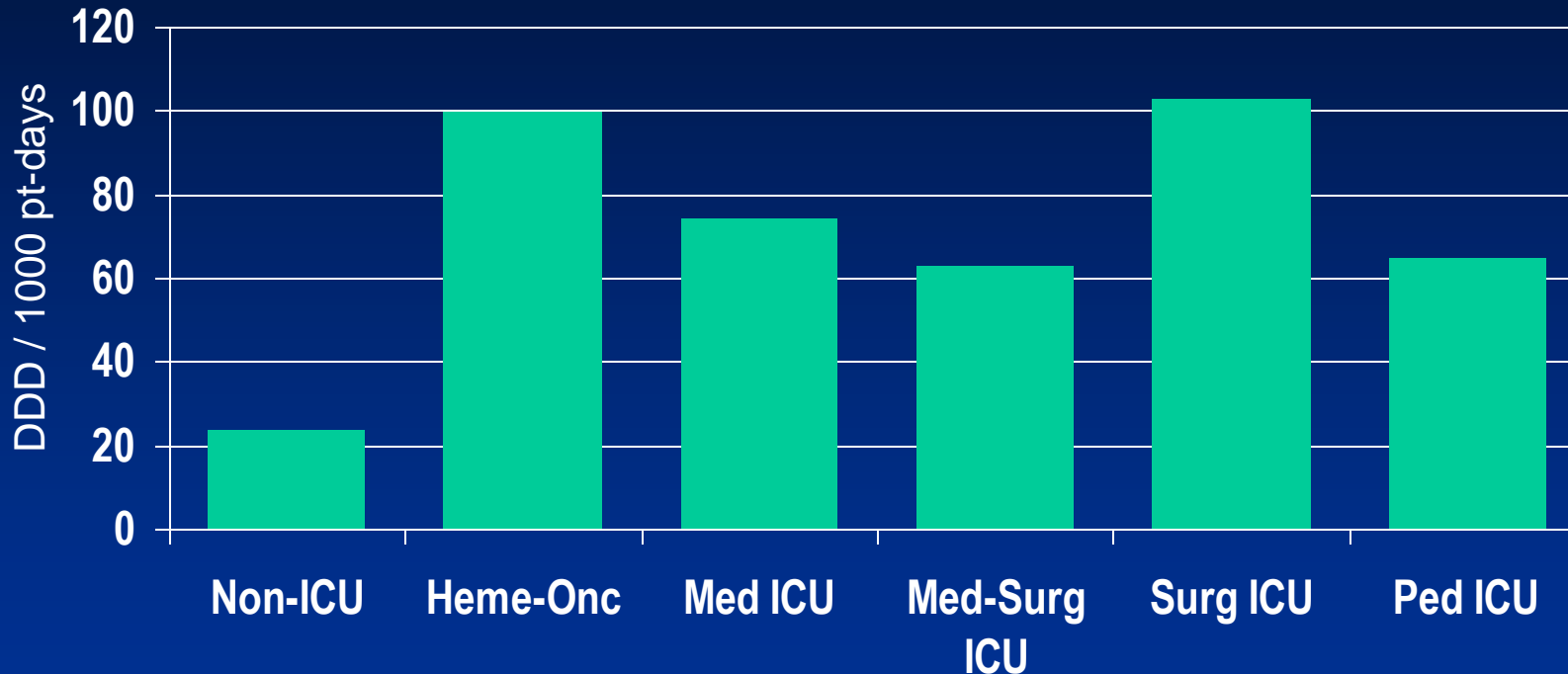


Use Antimicrobials Wisely
**Step 9: Know when to
say “no” to vanco**

Fact: Vancomycin overuse promotes emergence, selection, and spread of resistant pathogens.

Vancomycin Utilization in Hospitals

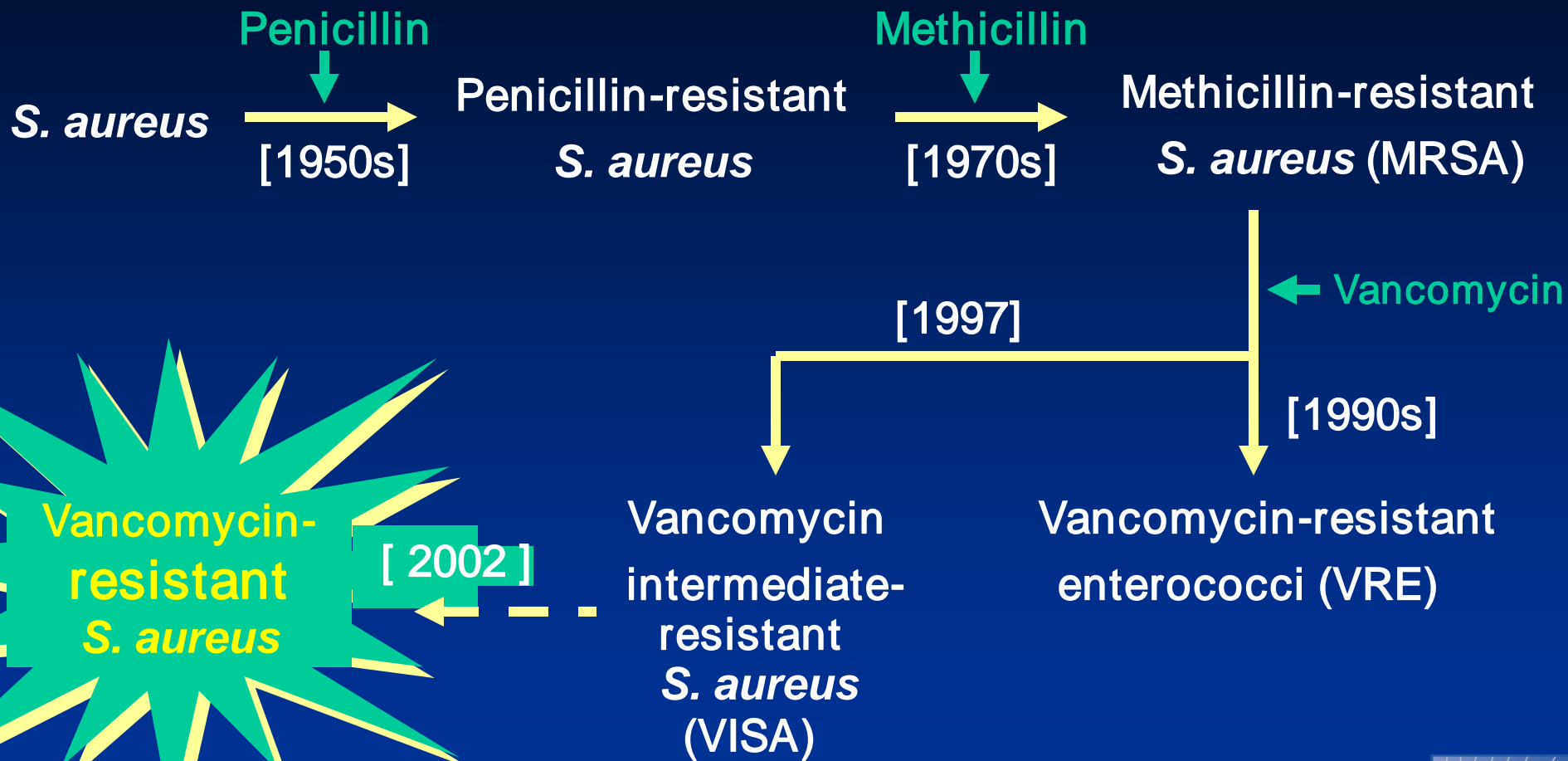
(defined daily doses per 1000 patient-days)



Source: National Nosocomial Infections Surveillance (NNIS) System



Evolution of Drug Resistance in *S. aureus*



➤ [Link to: MMWR on VRSA](#)

➤ [Link to: CDC Facts about VISA](#)

➤ [Link to: CDC Facts about VRE](#)



Use Antimicrobials Wisely

Step 9: Know when to say “no” to vanco

Fact: Vancomycin overuse promotes emergence, selection, and spread of resistant pathogens.

Actions:

- ✓ treat infection, not contaminants or colonization
- ✓ fever in a patient with an intravenous catheter is not a routine indication for vancomycin



Use Antimicrobials Wisely

Step 10: Stop treatment when infection is cured or unlikely

Fact: Failure to stop unnecessary antimicrobial treatment contributes to overuse and resistance.



Use Antimicrobials Wisely

Step 10: Stop antimicrobial treatment

Fact: Failure to stop unnecessary antimicrobial treatment contributes to overuse and resistance.

Actions:

- ✓ when infection is cured
- ✓ when cultures are negative and infection is unlikely
- ✓ when infection is not diagnosed



Prevent Transmission
Step 11:
Isolate the pathogen

Fact: Patient-to-patient spread of pathogens can be prevented.



Prevent Transmission

Step 11: Isolate the pathogen

Fact: Patient-to-patient spread of pathogens can be prevented.

Actions:

- ✓ use standard infection control precautions
- ✓ contain infectious body fluids
(use approved airborne/droplet/contact isolation precautions)
- ✓ when in doubt, consult infection control experts

➤ [Link to: A VRE prevention success story](#)

➤ [Link to: CDC isolation guidelines and recommendations](#)

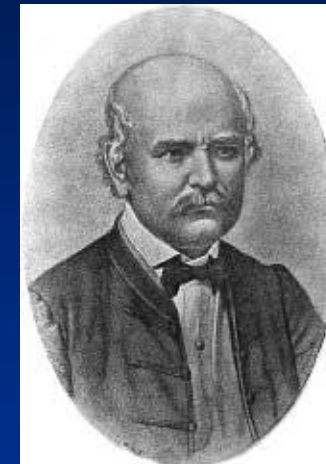


Prevent Transmission

Step 12: Break the chain of contagion

Fact: Healthcare personnel can spread antimicrobial-resistant pathogens from patient-to-patient.

Improved Patient Outcomes associated with Proper Hand Hygiene



Ignaz Philipp Semmelweis
(1818-65)

Chlorinated lime hand antiseptis

➤ [Link to: Ignaz Semmelweis](#)

Effect of Hand Hygiene on Resistant Organisms

Year	Author	Setting	Impact on organisms
1982	Maki	adult ICU	decreased
1984	Massanari	adult ICU	decreased
1990	Simmons	adult ICU	no effect
1992	Doebbeling	adult ICU	decreased with one versus another hand hygiene product
1994	Webster	NICU	MRSA eliminated
1999	Pittet	hospital	MRSA decreased

ICU = intensive care unit; NICU = neonatal ICU

MRSA = methicillin-resistant *Staphylococcus aureus*

Source: Pittet D: *Emerg Infect Dis* 2001;7:234-240

➤ Link to: [Improving hand hygiene](#)



Prevent Transmission

Step 12: Break the chain of contagion

Fact: Healthcare personnel can spread antimicrobial-resistant pathogens from patient to patient.

Actions:

- ✓ stay home when you are sick
- ✓ contain your contagion
- ✓ keep your hands clean
- ✓ set an example!

- [Link to: Health guidelines for healthcare personnel](#)
- [Coming soon...new guidelines for hand hygiene](#)

No Action Today

No Cure Tomorrow