

# *Nuove strategie per contrastare l'antimicrobico-resistenza: nanotecnologie e riposizionamento di farmaci*

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# Anti-Microbial Resistance

Medicines for treating infections lose effect because the microbes change;

1. mutate
2. acquire genetic information from other microbes to develop resistance

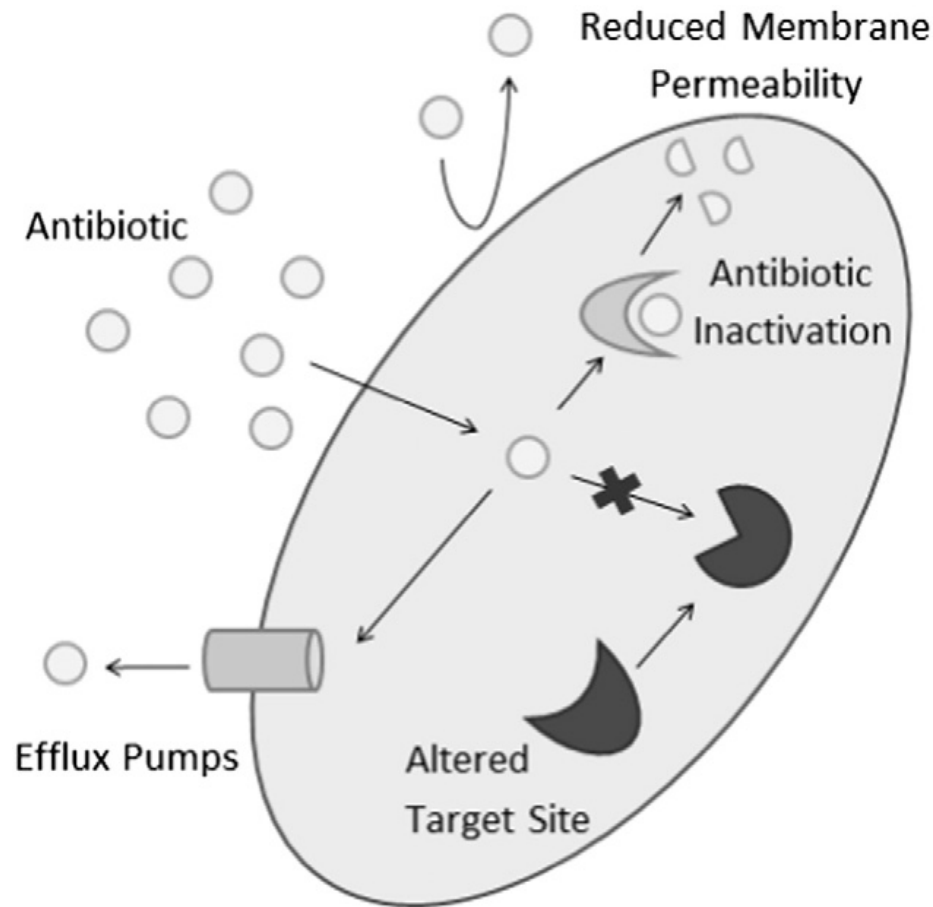
## Types of AMR

- |                                    |   |
|------------------------------------|---|
| 1. <b>Antibacterial resistance</b> | (e.g. to antibiotics and other antibacterial drugs)   |
| 2. <b>Antiviral resistance</b>     | (e.g. to anti-HIV medicines)                          |
| 3. <b>Antiparasitic resistance</b> | (e.g. to anti-malaria medicines)                      |
| 4. <b>Antifungal resistance</b>    | (e.g. to medicines used to treat <i>Candidiasis</i> ) |



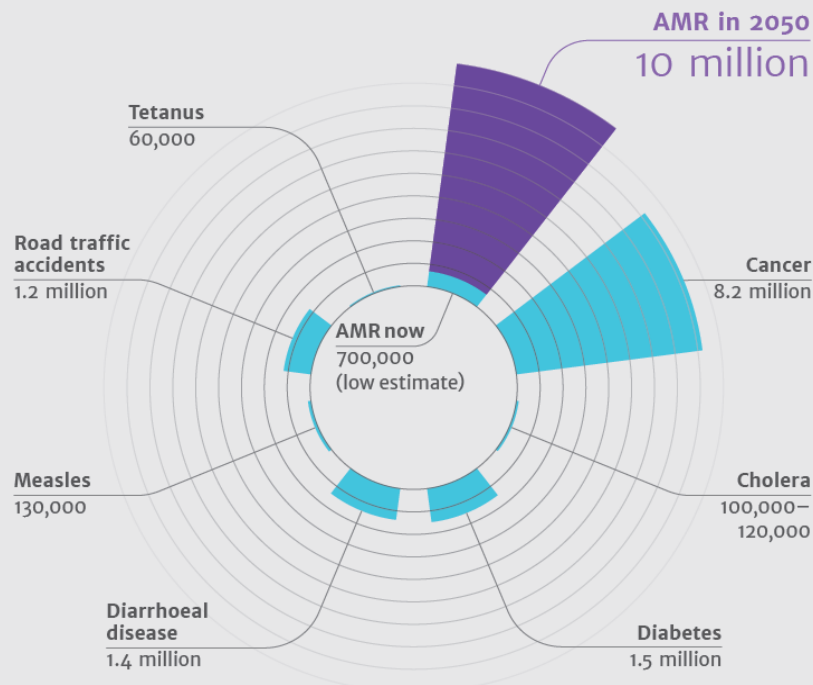
AMR is a natural phenomenon accelerated by use of antimicrobial medicines. Resistant strains survive and aggregate.

# mechanisms of antimicrobial resistance

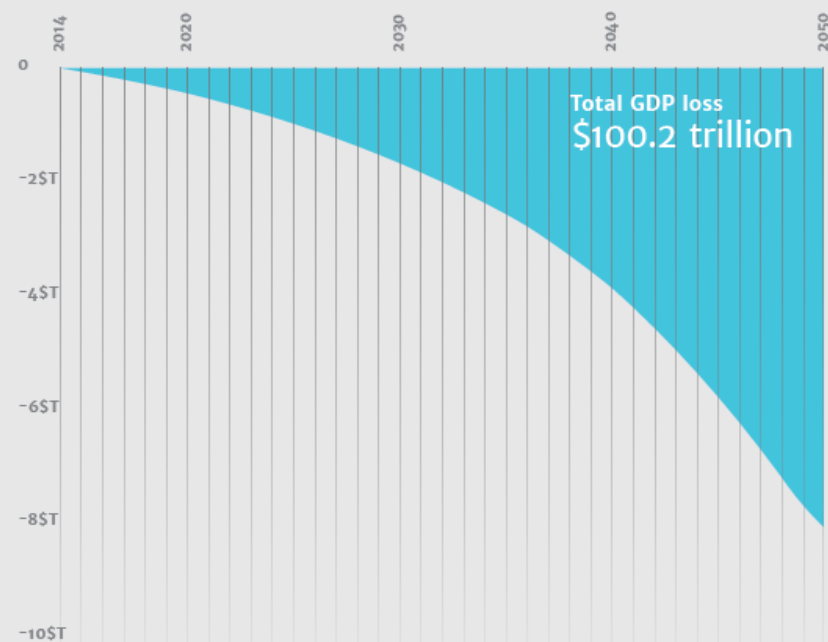


# Antimicrobial Resistance: tackling a crisis for the health and wealth of nations, 2014

## Deaths attributable to AMR every year compared to other major causes of death

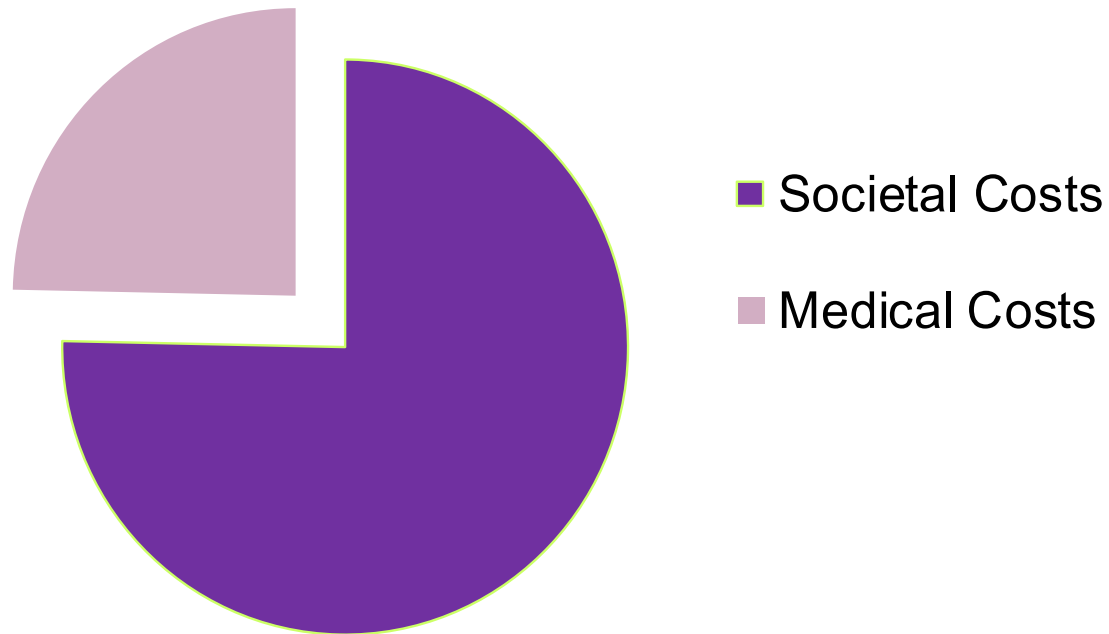


## AMR's impact on World GDP in trillions of USD



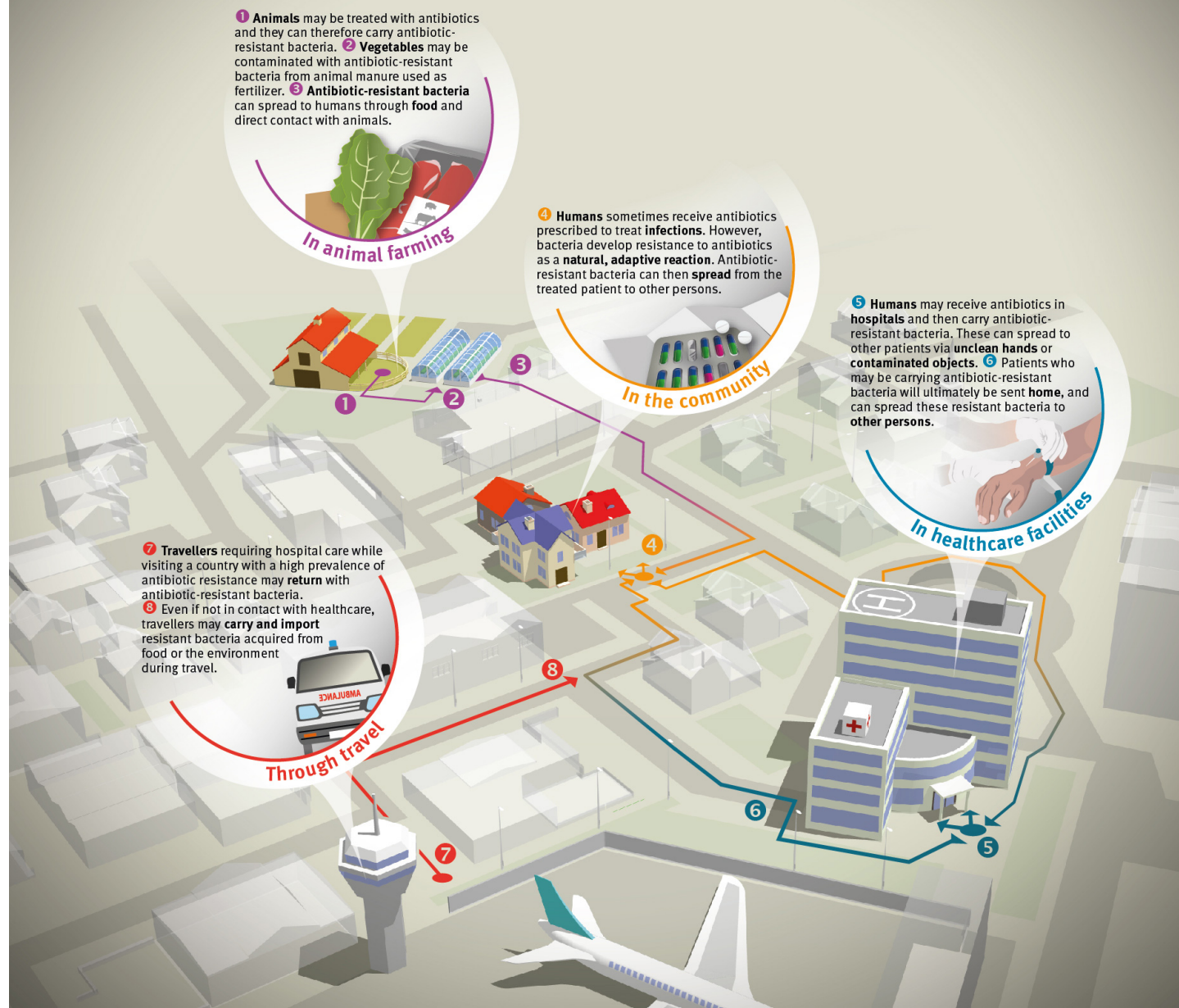
# AMR

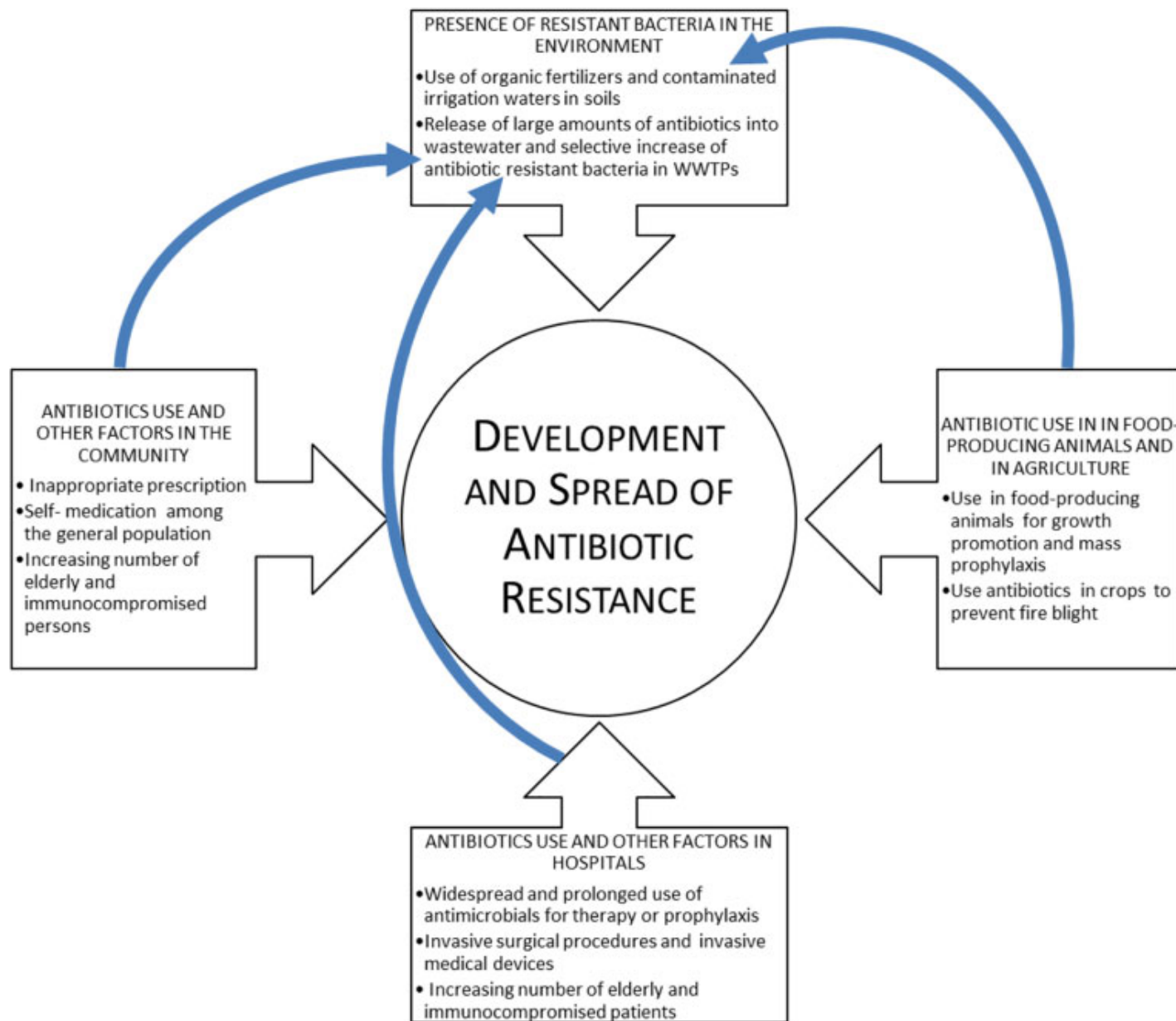
## overall economic impact



# How does antibiotic resistance spread?

Antibiotic resistance is the ability of bacteria to combat the action of one or more antibiotics. Humans and animals do not become resistant to antibiotic treatments, but bacteria carried by humans and animals can.

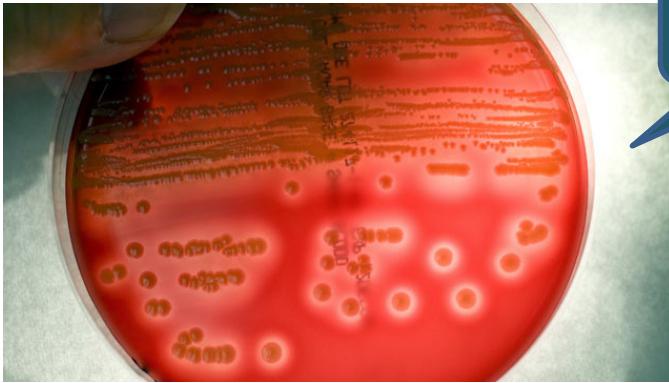




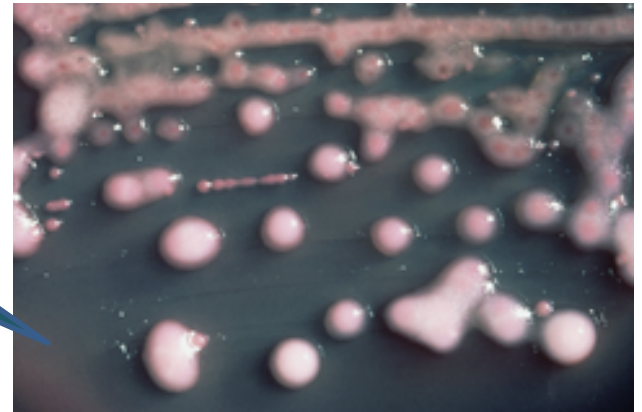


# Multi Drug Resistant Organisms

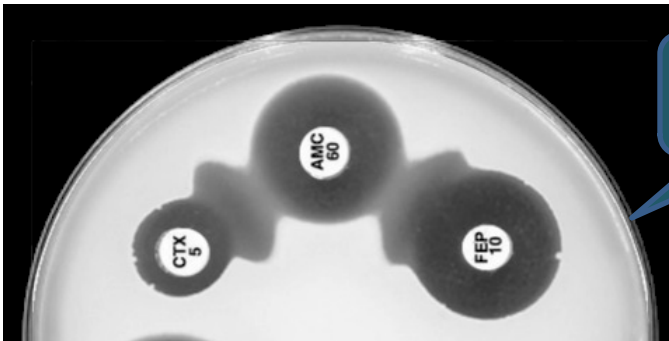
## MDROs



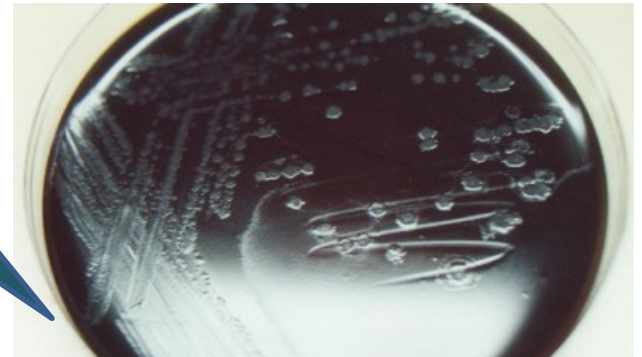
MRSA



KPC



ESBL



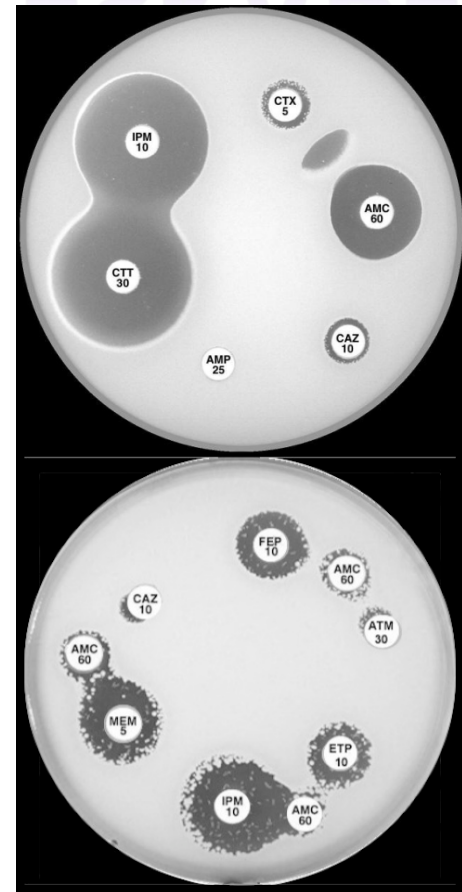
VRE



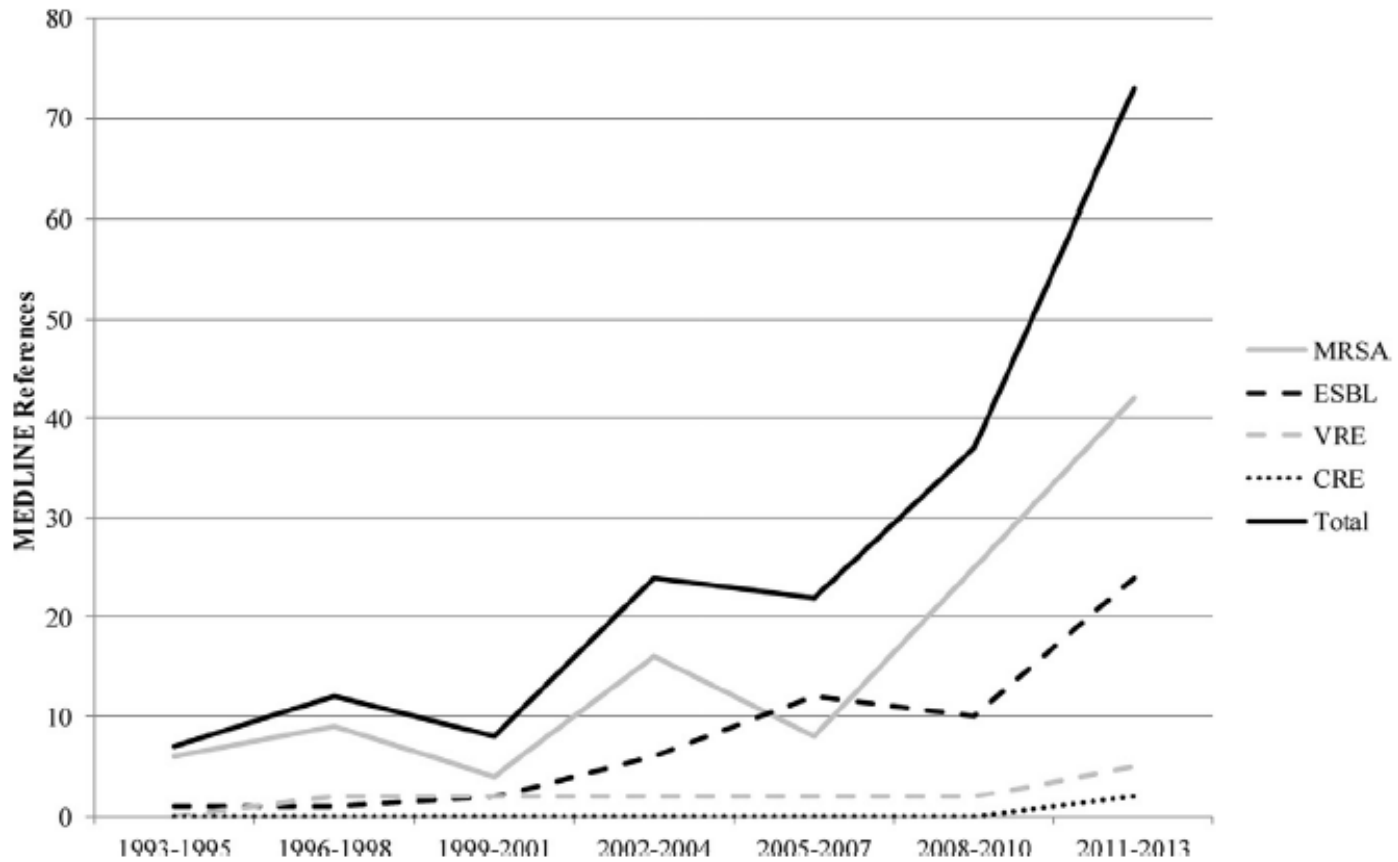
# *bad bugs, no drugs*

- *Enterococcus faecium*
- *Staphylococcus aureus*
- *Klebsiella pneumoniae*
- *Acinetobacter baumannii*
- *Pseudomonas aeruginosa*
- *Enterobacter* spp.

## ESKAPE



# MDROs in NICU



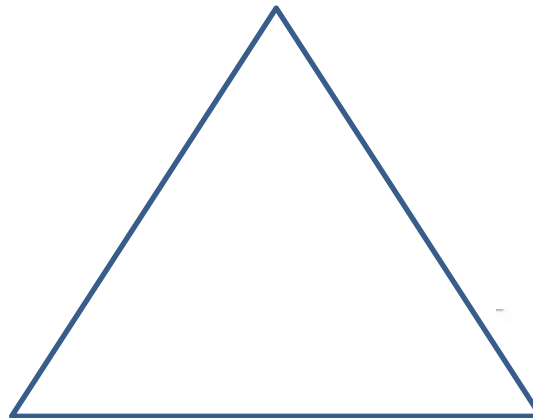
## newborn

- prematurity
- low birth weight
- malformations
- surgical treatment
- ...



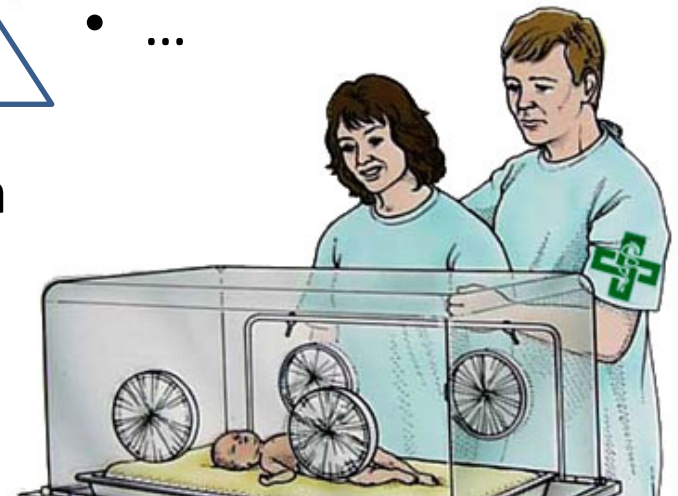
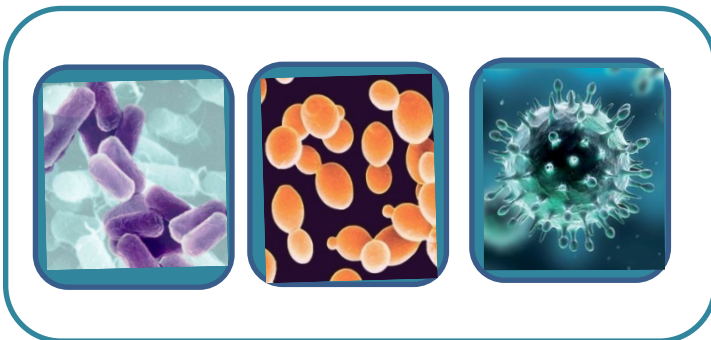
## NICU

- structural features
- health care workers
- policies
- occupational index
- inborn/outborn ratio
- invasive procedures
- invasive devices
- ...

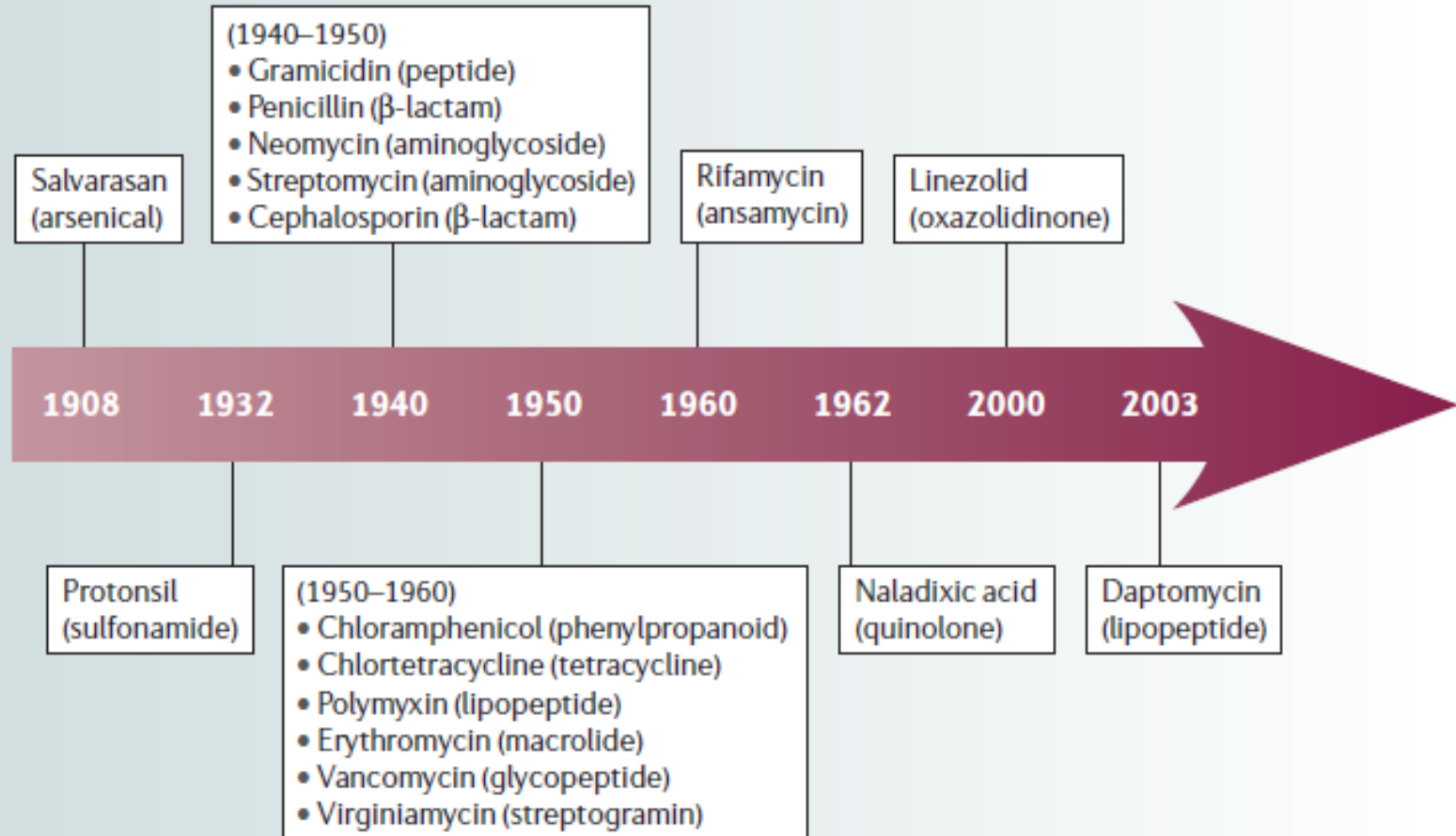


## microorganism

- Gram +
- Gram -
- MDR



## Timeline | Antibiotic drug discovery



The class of the antibiotic is shown in brackets.