Expert rules in antimicrobial susceptibility testing

Sören Gatermann
Bochum, Germany
soeren.gatermann@rub.de
Objectives

- improve therapeutic relevance of susceptibility testing results
- recognition of the unusual
- should have consequences
  - modify result
  - add comment
  - suggest additional tests
Unusual phenotypes

- Resistance to penicillin G in group A streptococci
- Susceptibility to linezolid in *E. coli*
Recognition of the unusual

- using the tables
  - intrinsinc resistances
    - a dash in the breakpoint table
  - exceptional phenotypes

IF intrinsic resistance is absent
OR an exceptional phenotype (R/S) is found
THEN
check identification/susceptibility tests
Utility of the rules

• Intrinsic resistance or unusual phenotype
  • check identification and/or susceptibility test
• expert rules
  • based on clinical data on the usefulness of a drug in a given species or in a particular phenotype
  • avoid inappropriate use of a drug
Intrinsic resistance tables vs. expert rules

- There is a dash "-" in the table but the organism is not called "intrinsically resistant", Why?

  e.g.
  - *Enterobacter* and cefuroxime
  - *Morganella morganii* and cefuroxime
  - *Acinetobacter* and ceftazidime
Cefuroxime *E. cloacae*

![Graph showing the distribution of cefuroxime MICs for *E. cloacae*](image-url)
Cefuroxime *M. morganii*

![Graph showing MIC values for Morganella morganii](image-url)
Acinetobacter and Ceftazidime

"-“ in breakpoint table
Implicit expert rules

- A dash „-“ in the table says „do not use this drug on this organism“
- Regardless of the testing result report as resistant (or not at all)
- This does not imply that all strains appear resistant in susceptibility tests
Salmonella

- therapy with aminoglycosides (or some cephalosporins) is not recommended
- *in vitro* MICs are often below the breakpoints for other *Enterobacteriaceae*
- this is an expert rule, not intrinsic resistance
In staphylococci, streptococci and corynebacteria

**IF** erythromycin resistant **AND** clindamycin susceptible

**THEN**

test for induction of clindamycin resistance by erythromycin

**IF** induction positive

**THEN** report clindamycin resistant
Expert Rules for *Enterobacteriaceae* with AmpC

For *Enterobacter* spp., *Citrobacter freundii* group and *Hafnia alvei*

**IF** susceptible to 3rd gen. cephalosporin(s)

**THEN**

- report with a warning that resistance may arise during therapy
- **OR** omit from report
Expert Rules for *Enterobacteriaceae* with AmpC

Kohlmann et al
Poster P0239 session P011
Recognize carbapenemases

- if the MIC is low, then this drug – even a carbapenem – may be used
- therapy with carbapenems is less effective if carbapenemase is present
- efficacy depends on carbapenemase and dosing
Combination therapy better than single agent

![Graph showing survival rates for combination therapy and single agent over time.]

Tofas IJAA (2016) 47:335
Expert rule for carbapenemases

IF MIC of meropenem > 0.12 OR zone diameter < 27 mm
THEN
  test and report MIC
  check for presence of carbapenemase
  IF carbapenemase positive
  THEN
    add comment that therapy may need combination