

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
 - intrinsic 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

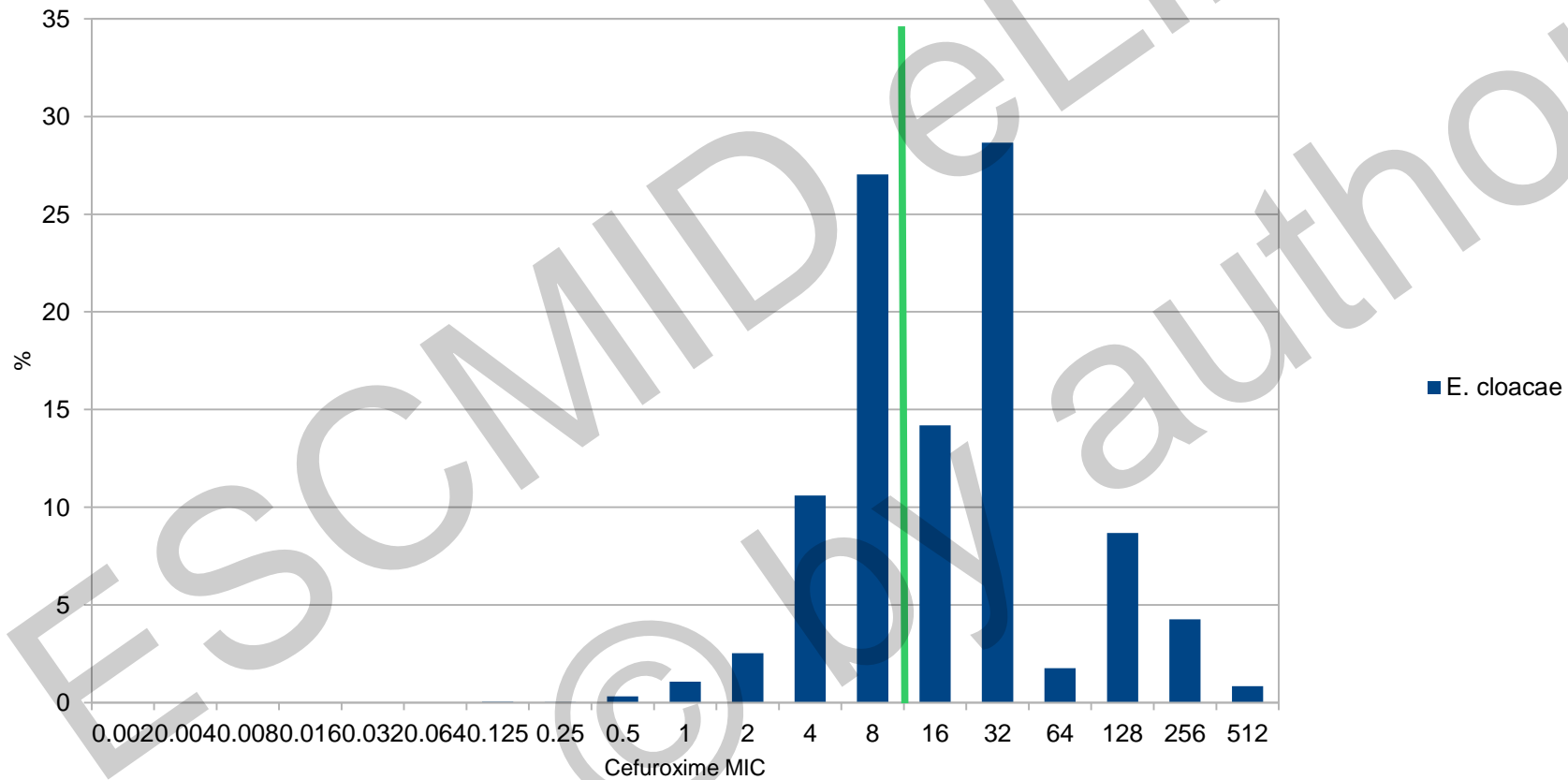
Utility of the rules

- 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

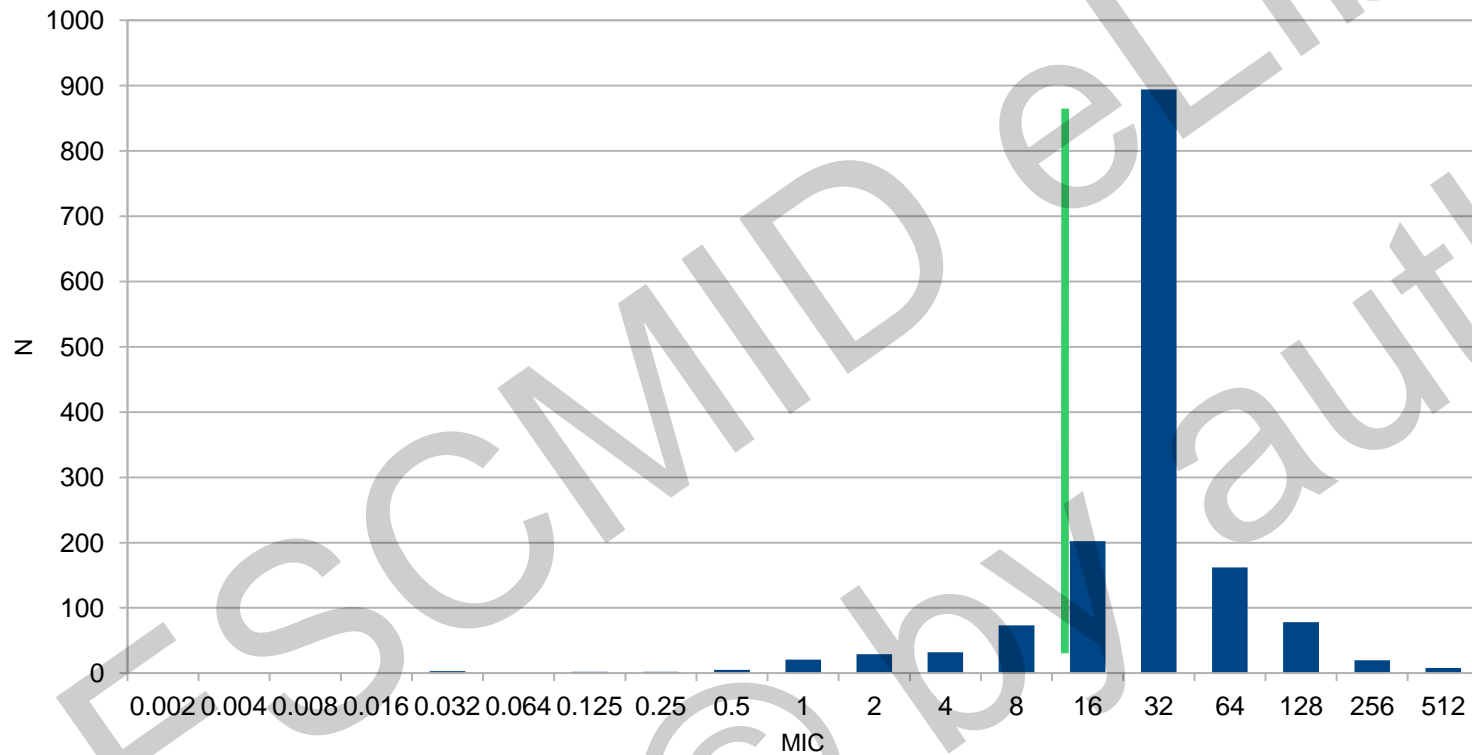
- There is a dash „-“ in the table but the organism is not called „intrinsically resistant“, Why?
- e.g.
 - *Enterobacter* and cefuroxime
 - *Morganella morganii* and cefuroxime
 - *Acinetobacter* and ceftazidime

Cefuroxime *E. cloacae*

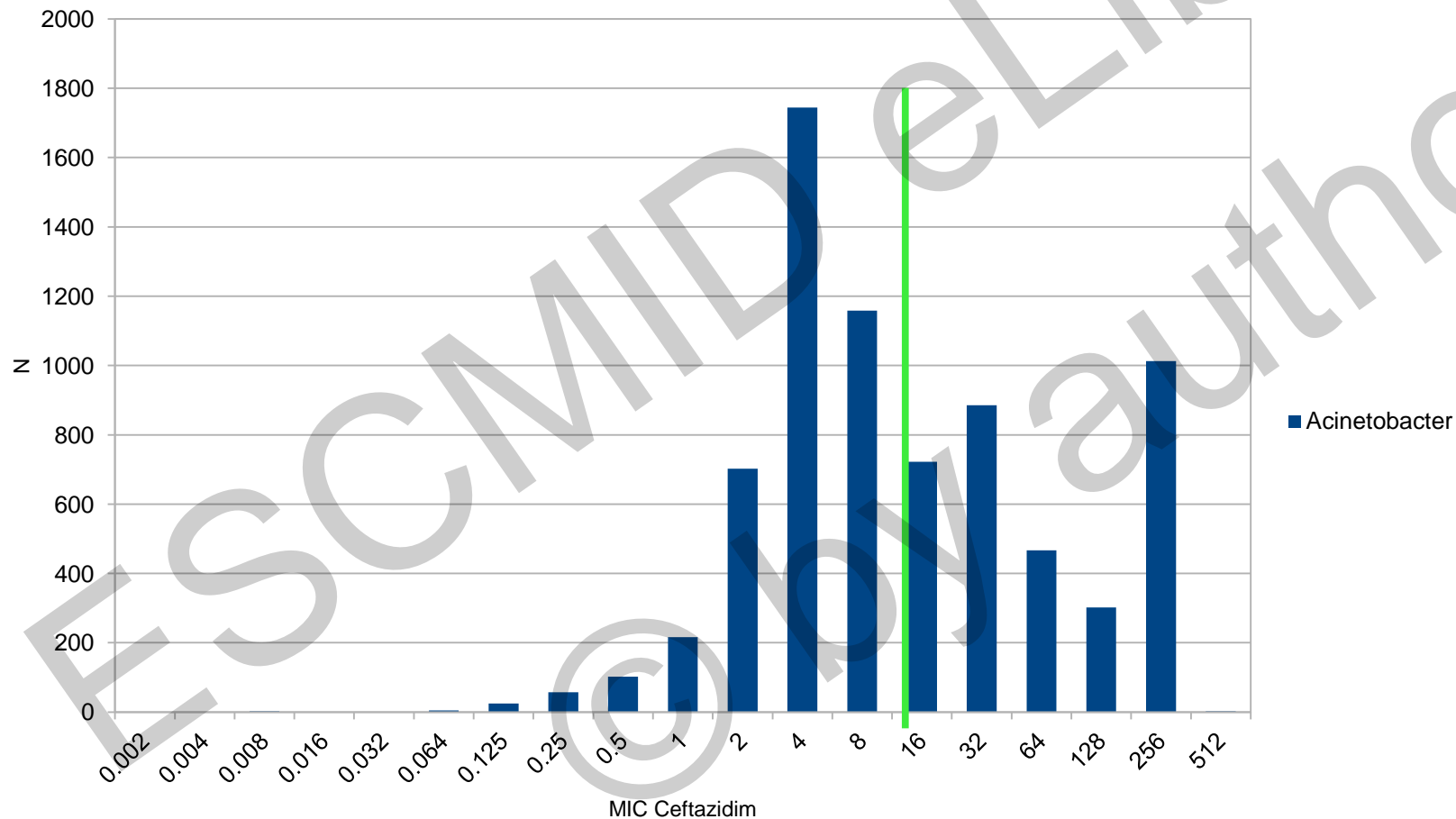


Cefuroxime *M. morgani*

Morganella morgani



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

MLS Expert Rules

B

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*

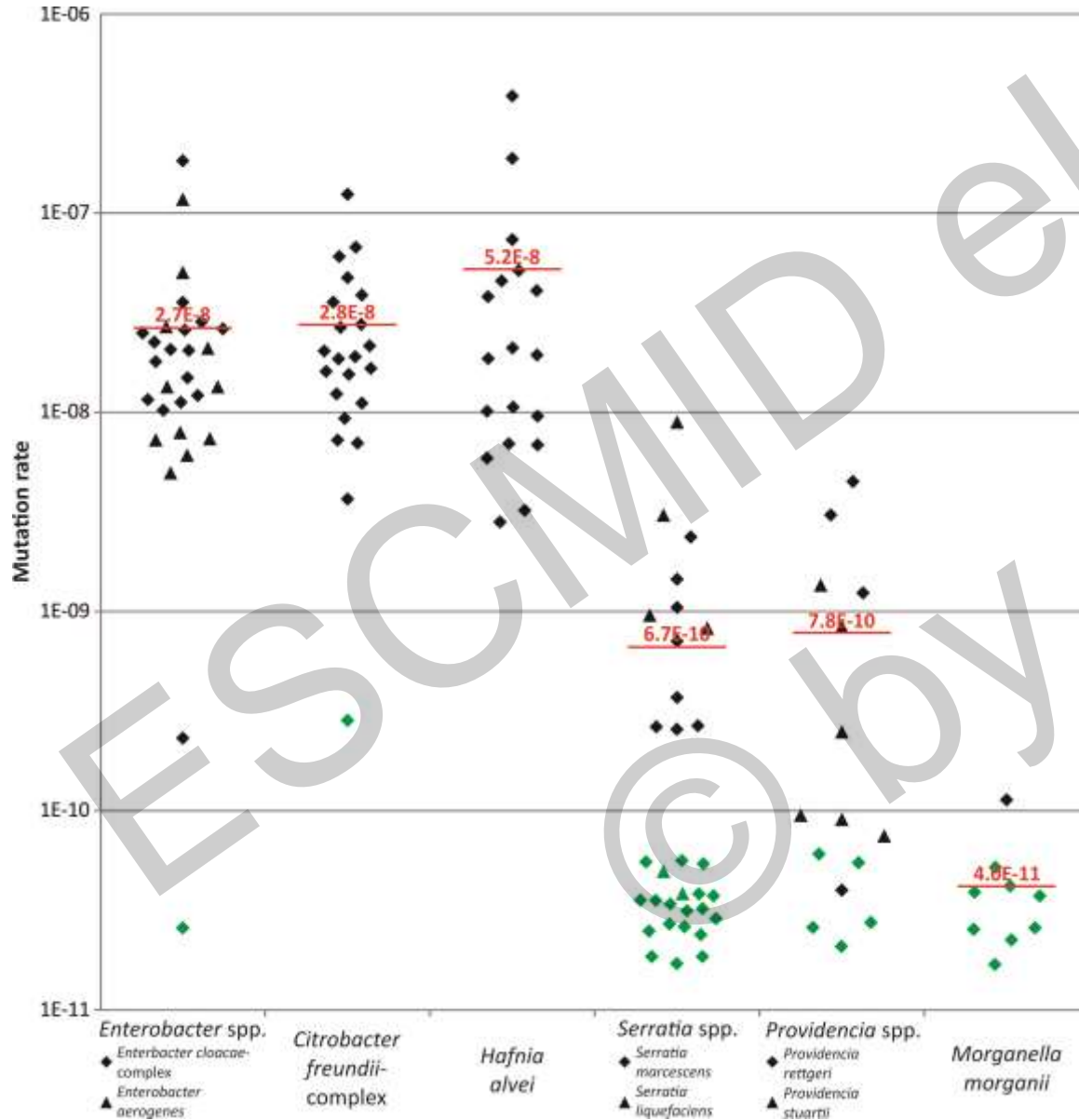
IF susceptible to 3rd gen. cephalosporin(s)

THEN

report with a warning that resistance may arise during therapy

OR omit from report

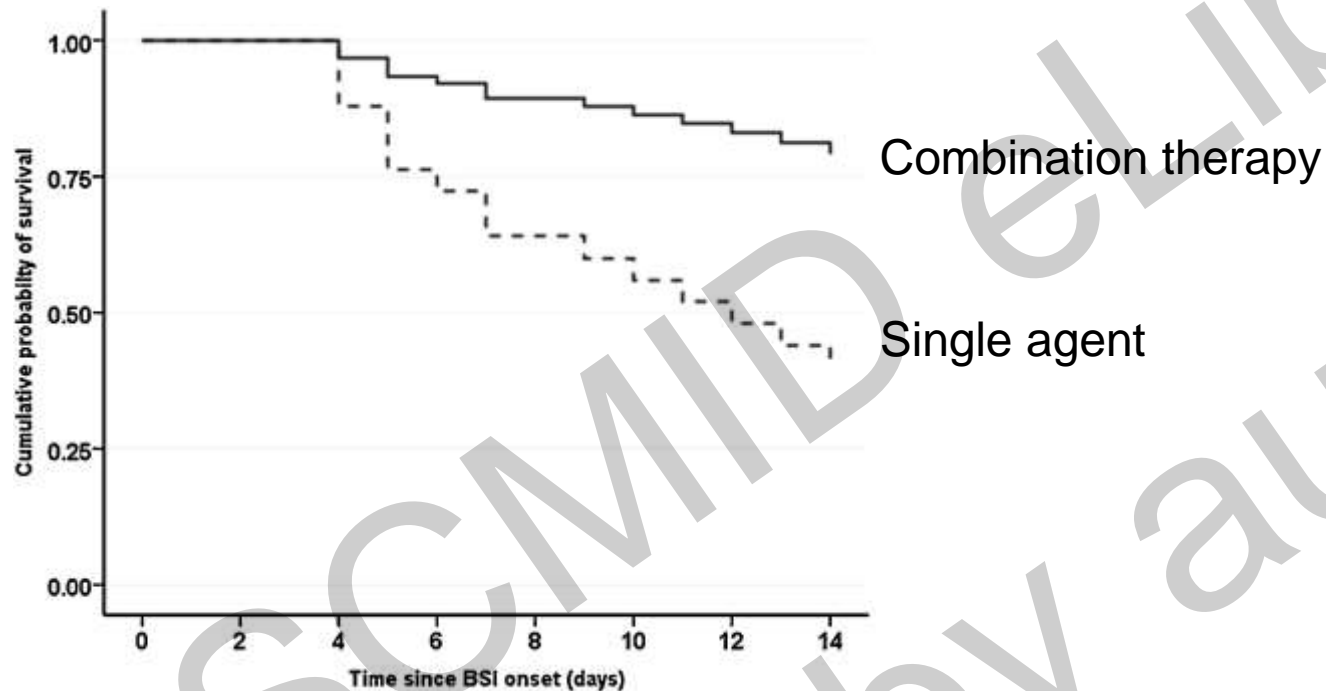
Expert Rules for *Enterobacteriaceae* with AmpC



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
Hagihara et al JAC 68:161 (2013)
- efficacy depends on carbapenemase and dosing
Wiskirchen et al AAC 57:3936 (2013), AAC 58:1671 (2014)

Combination therapy better than single agent



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

ESCMID eLibrary
© by author