JMM Correspondence

Vitek2 may deduce false susceptibility to cefixime in *Staphylococcus*

The VITEK 2 (bioMérieux) Advanced Expert System (AES) suggests biological corrections when a single MIC inconsistency is detected and it is presumed that an error has occurred in the generated data, results are atypical due to the strain, a false-negative result is provided (for instance non-induced β-lactamase), or an incorrect one was entered by the operator (Sanders *et al.*, 2001). For instance, any discrepancies between the cefoxitin screening and the oxacillin MIC are fixed with a biological correction when investigating β-lactam resistance in *Staphylococcus* isolates (Sanders *et al.*, 2001).

Instead, a therapeutic correction is made when no bacteriological error is presumed, but the interpretation of the MIC is modified; for instance, cotrimoxazole MICs may be in the susceptible range for a few strains of *Pseudomonas aeruginosa* but interpretation is changed to resistant by the AES (Sanders *et al.*, 2001).

Finally, the AES also deduces susceptibility to drugs not tested, and the user may select which antibiotics have to be deduced among those available (Sanders *et al.*, 2001).

In our experience, we have observed over the years that inherent enterococcal resistance to cephalosporins and resistance to β-lactams in oxacillin/methicillin-resistant *Staphylococcus* isolates and ampicillin-resistant enterococci are correctly predicted. Conversely, oxacillin-susceptible staphylococci are automatically reported as susceptible to cephalosporins, carbapenems and penicillin/β-lactamase inhibitor combinations, while ampicillin-susceptible *Enterococcus faecalis* isolates are deduced as susceptible to penicillin/β-lactamase inhibitor combinations and imipenem, but correctly reported as cephalosporin-resistant (intrinsic resistance).

When configuring AES according to EUCAST interpretive breakpoints, we decided to have the activity of several cephalosporins deduced for staphylococci, including cefixime. Although it is well known that methicillin-resistant strains exert almost pan-β-lactam resistance (Savini *et al.*, 2010), this choice aims to remind clinicians that cephalosporins may be used to treat oxacillin-susceptible *Staphylococcus* infections, with the exception of oral cefixime (Shenep *et al.*, 2001). Surprisingly, we observed that oxacillin-susceptible staphylococci were deduced as cefixime-susceptible by the AES. This suggests that such an intrinsic resistance trait was not included in the instrument database.

Cefixime shows a broad spectrum of activity, which includes most of the commonly encountered respiratory and urinary pathogens (Neu, 1987). In general, the drug is superior to cephalexin, cephradine, cefadroxil and cefaclor against all bacteria other than staphylococci, *in vitro*, and is not affected by most of the common plasmid and chromosomal β-lactamases (Neu, 1987). Nonetheless, *P. aeruginosa*, *Acinetobacter* and *Listeria* species, anaerobes, and staphylococci have been known to display intrinsic resistance (Neu, 1987; Shenep *et al.*, 2001).

Hence, this letter aims to further highlight a few key points in the context of *Staphylococcus* resistance to antibiotics: oxacillin-resistant strains exert resistance to all β-lactams, with the exception of cetfobiprole (Macdonald & Dow, 2010) and ceftaroline (Girish & Balakrishnan, 2011); conversely, oxacillin-susceptible isolates are susceptible to cephalosporins, except for cefixime, which appears to be inherently ineffective against members of this genus.

As cefixime is a valid therapeutic option for infections by susceptible organisms, it is important to accurately judge inherent resistances so that the drug may be administered correctly. Improper use may, in fact, lead to clinical failure and selection of resistance by commonly susceptible species.

To avoid the risk of reporting staphylococcal isolates as cefixime-susceptible, we suggest that operators manually configure the AES by taking into account this inherent resistance, until the manufacturer provides the instrument database with such a phenotype. Otherwise, colleagues should not ask the system to deduce cefixime activity when testing staphylococci.

To conclude, VITEK 2 offers a standardized method ideally suited to laboratories lacking familiarity with myriad resistance mechanisms and/or those not testing an appropriate range of antibiotics to detect resistant phenotypes using interpretative reading (Barry *et al.*, 2003). Nonetheless, we believe machines cannot replace microbiologists, who should always consider results from automated tests in the light of their personal knowledge and experience.

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