

# **EARSS EQA exercise 2003:**

## **Summary of Irish results**

Twenty-four of the 26 EARSS laboratories in Ireland took part in the annual EARSS EQA exercise and reported back to UK-NEQAS by the Friday 3<sup>rd</sup> October deadline. One additional lab was unable to meet deadline due to staff shortage but reported later to NDSC. Their results are not included in this report as they do not dramatically alter the overall results.

### **Specimen U2A 166 *S. aureus***

This strain was fully susceptible to the antibiotics listed (see attached sheet).

All Irish labs performed excellently, with just one laboratory reporting ciprofloxacin as resistant.

### **Specimen U2A 1786 *S. aureus***

This strain was heterogeneously resistant to methicillin/oxacillin and was additionally resistant to ciprofloxacin, erythromycin, penicillin and ceftiofur.

Only 83% (20 of 24) of labs correctly identified that this strain was (heterogeneously) resistant to methicillin. This compares with 81% of all EARSS labs throughout Europe. Of the four labs that failed to detect this resistance, two used modified-Stokes and two used NCCLS methodologies (Etest MICs 1.5 and 2 mg/L).

Testing ceftiofur has been proposed as an alternative to oxacillin for detecting methicillin resistance. Only 73% (8 of 11) of Irish labs that tested this antibiotic correctly reported that this strain was resistant to ceftiofur. Of the three labs that failed to identify this resistance, two used mod-Stokes and one used NCCLS methodologies. However, the two labs using mod-Stokes reported this strain as methicillin-resistant. The lab using NCCLS reported this strain as methicillin-susceptible.

### **Specimen U2A 961 *S. pneumoniae***

This strain was susceptible to all antibiotics listed except erythromycin.

Irish labs performed well on this specimen. One lab found this strain to be intermediately-resistant to penicillin (Etest 0.19 mg/L using NCCLS methodology). Another lab correctly reported that this strain was susceptible to penicillin but resistant to cefotaxime and susceptible to erythromycin (by DD using mod-Stokes).

Four labs reported the strain to be either ciprofloxacin-intermediate or resistant (one each using NCCLS, BSAC and mod-Stokes and one methodology not stated). However, it should be pointed out that there are no NCCLS interpretive criteria for this particular

antibiotic and according to BSAC isolates are only classified as either intermediate or resistant (there is no susceptible category).

### **Specimen U2A 1787 *S. pneumoniae***

This strain was intermediately-resistant to penicillin but susceptible to the other antibiotics listed.

This strain was correctly identified as oxacillin non-susceptible by 90% (18 of 20) of Irish labs that used oxacillin as an initial screening test, which compares with 86% of all European EARSS labs. Two labs reported the strain as oxacillin-susceptible (both using mod-Stokes).

However, only 57% (13 of 23) of labs correctly interpreted this strain as being intermediately-resistant to penicillin. Four labs reported the strain as penicillin-resistant but with no Etest/MIC data to support this interpretation (and hence should be only considered as penicillin-non-susceptible), three of which used mod-Stokes and one used BSAC. Four other labs obtained an Etest MIC that would be interpreted as intermediate (0.38-0.25 mg/L) but were in fact reported as penicillin-resistant. Three of these labs used NCCLS guidelines, while the guidelines followed for the fourth were not stated.

One laboratory did not report either oxacillin or penicillin for this strain.

If the MIC values were re-interpreted according to guidelines followed, 74% (17 of 23) of Irish labs would have obtained the correct result.

### **Specimen U2A 1789 *E. coli***

This strain was an ESBL-producer and was resistant to ampicillin, piperacillin, cefotaxime, ceftriaxone and ceftazidime but susceptible to piperacillin/tazobactam. It was susceptible to ciprofloxacin and gentamicin but resistant to tobramycin.

Irish labs generally performed well here with 100% (n = 22) of labs that looked for ESBLs correctly reporting that this was an ESBL-producer. Two labs did not look for ESBLs but reported both cefotaxime and ceftazidime to be resistant. One lab reported the strain to be susceptible to piperacillin and resistant to piperacillin-tazobactam suggesting a transcription error in reporting. Only 68% (15 of 22) of labs reported the strain to be piperacillin-tazobactam susceptible. Of the 7 labs reporting the strain to be resistant to piperacillin-tazobactam, five followed mod-Stokes and two followed NCCLS methodologies. One lab (of 21) reported the strain to be cefotaxime-susceptible (using mod-Stokes) but ESBL-positive.

### **Specimen U2A 604 *E. gallinarum***

This strain was *E. gallinarum*, one of the enterococcal species that naturally expresses low-level resistance to vancomycin due to the presence of the chromosomal *vanC* gene.

Only 29% (7 of 24) of Irish labs correctly identified this strain as *E. gallinarum*. Of the other 17 labs, five identified it as *E. casseliflavus*, seven as *E. faecium*, two as *E. faecalis*, two as *Enterococcus* spp and one as *Streptococcus* spp.

This strain was intermediate or low-level resistant to vancomycin, which only 58% (13 of 24) of Irish labs correctly identified (compared with 58% of European EARSS labs). Otherwise the strain was susceptible to ampicillin, gentamicin and teicoplanin, which all labs correctly identified. However, two labs specified that they use a gentamicin-10 µg disc to test for susceptibility to this agent. Of the 12 labs that reported the breakpoint they would use to denote high-level resistance to gentamicin, one specified 200 and one  $\geq 200$  (mg/L) but neither of these labs specified the guidelines they use for MIC determination (both use mod-Stokes for DD).

Of the 11 labs not reporting the correct interpretation for vancomycin susceptibility:

- One found the strain to be susceptible with an Etest MIC of 1 mg/L (NCCLS).
- One found the strain to be susceptible but with no MIC reported (mod-Stokes).
- Two reported the strain to be susceptible but with Etest MICs of 8 and 16 mg/L, both of which are in fact intermediate according to NCCLS guidelines.
- Four reported the strain to be resistant but with no MIC reported. Three of these labs used mod-Stokes while the other followed BSAC guidelines (for which there is no intermediate category).
- Three reported the strain to be resistant. Two of these followed NCCLS guidelines and obtained Etest MICs of 6 and 12 mg/L that, when rounded up as required, would be interpreted as intermediate. The third lab followed BSAC guidelines and the Etest MIC of 8 mg/L would be interpreted as resistant (no intermediate category).

If the MIC values were re-interpreted according to guidelines followed, 75% (18 of 24) of Irish labs would have obtained the correct result.

## Conclusion

The response to the EARSS EQA exercise for 2004 has been excellent with just one of the 26 Irish EARSS laboratories unable to take part due to resource issues.

The results by the Irish laboratories are mostly equivalent to, if not better than, the European average with just a couple of exceptions: penicillin interpretation of *S. pneumoniae* strain U2A 961 and species identification of the enterococcal strain U2A 604.

A number of issues should be highlighted that may help to overcome some of the problems:

1. When testing for methicillin/oxacillin resistance in staphylococci, plates should be incubated for the full 24 hours according to both NCCLS and BSAC guidelines before isolates are reported as susceptible.

Fewer labs detected the heterogeneously-resistant MRSA isolate, U2A 1786, using cefoxitin compared with methicillin/oxacillin. This does not seem to be a good recommendation based on these results. This needs to be validated using a standardised approach, such as NCCLS.

2. It is important that zone diameter sizes are read for oxacillin when screening for non-susceptibility to penicillin, preferably using a standardised protocol. Isolates with a zone diameter of 19mm or less should be further tested using an MIC method to confirm and determine the level of resistance (intermediate or high-level).
3. *E. coli* isolates that are found to produce ESBLs are by definition resistant to all penicillins (including piperacillin), cephalosporins and aztreonam regardless of apparent in vitro susceptibility. In the presence of clavulanic acid or other beta-lactamase inhibitors, the zone sizes of some of these agents should increase (hence the rationale for the double-disc and other screening tests to detect these enzymes). As a result, these beta-lactam-beta-lactamase inhibitor combinations may remain susceptible (refer to testing guidelines for correct interpretation).
4. When performing Etests to determine MICs, please refer to the testing guidelines being followed in order to correctly interpret the results. In the final laboratory report, amend the interpretation to reflect this. For example, penicillin Etest should be performed for all oxacillin non-susceptible pneumococcal isolates. The final report should state whether the isolate was intermediate (low-level resistant) or resistant (high-level resistant) or even susceptible.
5. Speciation of enterococci remains problematic. The experience gained by the labs that successfully identified the strain as *E. gallinarum* should be pooled in order to determine a “reasonable” approach to identifying enterococci.

**EARSS European quality assurance exercise 2003****Country: Ireland**

	Designated Interpretation	MICs (mg/L)	%correct of IE labs	%correct of EU labs
<b>Specimen U2A 166 <i>S. aureus</i> (wild type)</b>				
Species identification			100	99
Oxacillin	S	0.25-0.5	100	99
Gentamicin	S	≤0.38	100	99
Erythromycin	S	0.19-0.5	100	98
Tetracycline	S	0.25-0.5	100	99
Rifampicin	S	<0.016	100	99
Vancomycin	S	1-2	100	100
Teicoplanin	S	0.25-1	100	100
Penicillin	S	0.016-0.064	100	96
Ciprofloxacin	S	0.75-1	96	85
Cefoxitin	S	1-1.5	100	99
<b>Specimen U2A 1786 <i>S. aureus</i> (<i>mecA</i>)</b>				
Species identification			100	100
Oxacillin	R	2-4	83	81
Gentamicin	S	0.12-0.5	100	98
Erythromycin	R	>128	100	99
Tetracycline	S	0.25-1	100	99
Rifampicin	S	≤0.016	100	100
Vancomycin	S	1-2	100	99
Teicoplanin	S	0.25-2	100	99
Penicillin	R	6-64	100	98
Ciprofloxacin	R	≥16	100	94
Cefoxitin	R	4-12	73	78
<b>Specimen U2A 961 <i>S. pneumoniae</i> (efflux pump)</b>				
Species identification			100	98
Oxacillin	S	0.064	100	97
Penicillin-G	S	≤0.016	96	98
Ceftriaxone	S	0.016	100	98
Cefotaxime	S	0.016	95	99
Ciprofloxacin	S	0.75-1	79	84
Erythromycin	R	8-16	96	96
Clindamycin	S	0.125-0.5	100	95
<b>Specimen U2A 1787 <i>S. pneumoniae</i></b>				
Species identification			100	99
Oxacillin	IR	2	90	86
Penicillin-G	I	0.25	57	77
Ceftriaxone	S	0.047-0.125	100	98
Cefotaxime	S	0.016-0.064	100	96
Ciprofloxacin	S	0.38-1	83	88
Erythromycin	S	0.064-0.125	100	98
Clindamycin	S	0.125-0.38	94	99

**EARSS European quality assurance exercise 2003**

**Country: Ireland**

	Designated Interpretation	MICs (mg/L)	%correct of IE labs	%correct of EU labs
Ciprofloxacin	S	0.006-0.016	100	99
Cefotaxime	IR	>=16	95	91
Ceftriaxone	IR	>=12	100	90
Ceftazidime	R	>256	100	91
Piperacillin	R	>256	86	93
Piperacillin/Tazobactam	S	2	68	76
ESBL	positive		100	94
<b>Specimen U2A 604 E. gallinarium</b>				
Species identification			29	51
Amoxicillin	S	NT	100	97
Ampicillin	S	0.5-2	100	99
Vancomycin	I	12	58	58
Gentamicin	S	6	100	97
Teicoplanin	S	0.5-1	100	98