

EUROPEAN ANTIMICROBIAL RESISTANCE SURVEILLANCE SYSTEM (EARSS)



Quarter 1, 2002 June, 2002

Quarter 1 analysis

In Quarter 1 (Q1) 2002, twenty-two laboratories participated in the *Staphylococcus aureus* and *Streptococcus pneumoniae* arms of the study, while seventeen participated in the *Escherichia coli* and *Enterococcus faecalis/E. faecium* components. In addition to reporting data to the National Disease Surveillance Centre (NDSC), participating laboratories referred methicillin-resistant *S. aureus* (MRSA) isolates to the National MRSA Reference Laboratory (NMRSARL) at St. James's Hospital and both penicillin-susceptible *S. pneumoniae* (PSSP) and penicillin-non-susceptible *S. pneumoniae* (PNSP) isolates to the Pneumococcal Referral Laboratory, Beaumont/RCSI.

The full list of laboratories currently participating in EARSS in Ireland is printed at the end of this newsletter.

Staphylococcus aureus

Data from Participating Laboratories

A total of 279 episodes of *S. aureus* bacteraemia were reported. Isolates from 116 episodes (41.6%) of *S. aureus* bacteraemia were resistant to methicillin. Susceptibility data to the most important anti-staphylococcal antibiotics for methicillin-resistant and methicillin-susceptible *S. aureus* (MRSA and MSSA) are shown in Figure 1. One laboratory reported zero episodes of *S. aureus* bacteraemia during the quarter. No reports were received from two laboratories.

In comparison, there were 226 isolates in Q1 2001 yielding 45.6% MRSA. The MRSA rate for the year 2001 was 42.0%.

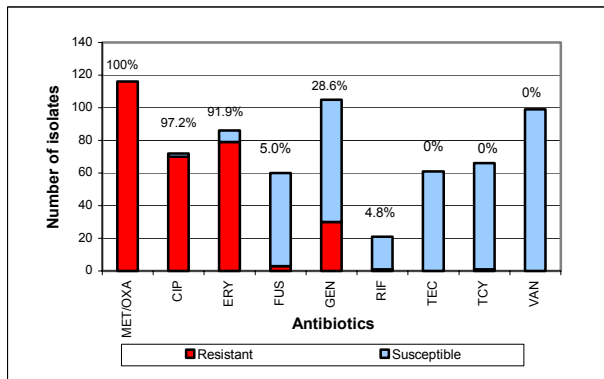


Figure 1. Susceptibility data for invasive isolates of MRSA reported in Q1 2002. Percentage resistance is indicated above the bar.

Antibiotic codes: MET – methicillin, OXA – oxacillin, CIP – ciprofloxacin, ERY – erythromycin, GEN – gentamicin, FUS – fusidic acid, RIF – rifampicin, TEC – teicoplanin, TCY – tetracycline, VAN – vancomycin.

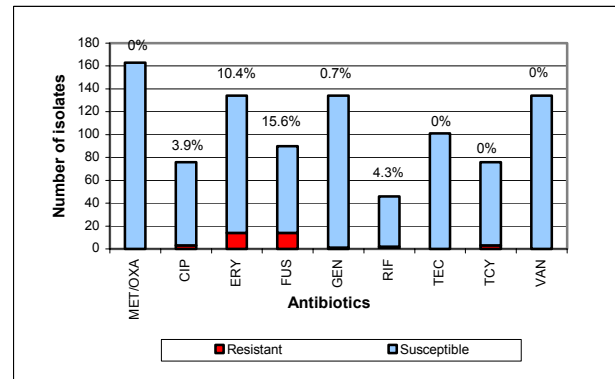


Figure 2. Susceptibility data for invasive isolates of MSSA reported in Q1 2002. Percentage resistance is indicated above the bar.

See legend for Figure 1 for explanation of antibiotic codes.

Data from National MRSA Reference Laboratory

One hundred of the above MRSA isolates were referred to NMRSARL for further evaluation, along with four additional isolates (either isolated subsequent to a methicillin-susceptible strain or a second strain of MRSA with a different antibiogram). No data were available on 16 isolates. Antibiogram results are shown in Figure 3.

Minimum inhibitory concentration (MIC) results (determined by Etest) were available on 100 isolates. The majority of isolates (90%, n=90) exhibited oxacillin MIC values of >256 mg/L. All isolates exhibited vancomycin MIC values of <4 mg/L.

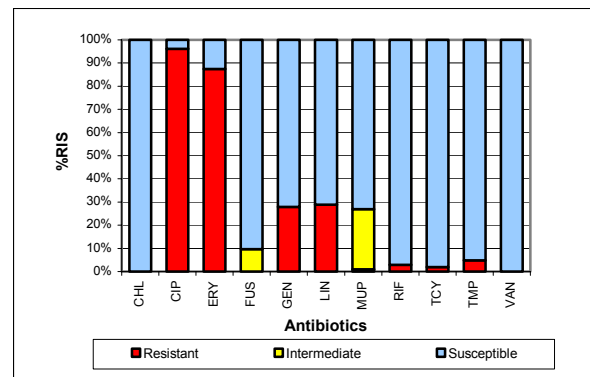


Figure 3. Antibiogram results for MRSA isolates (n=104) referred to NMRSARL in Q1 2002.

Antibiotic codes: CHL - chloramphenicol, CIP – ciprofloxacin, ERY – erythromycin, FUS – fusidic acid, GEN – gentamicin, LIN – lincomycin, MUP – mupirocin, RIF – rifampicin, TCY – tetracycline, TMP – Trimethoprim, VAN – vancomycin.

The overall adherence to the protocol for oxacillin and vancomycin MICs (required for MRSA isolates only) was 86.2%.

Streptococcus pneumoniae

Data from Participating Laboratories

Eighty-nine *S. pneumoniae* isolates (88 from blood and one from CSF) were reported. Isolates from five patients (5.6%) with *S. pneumoniae* bacteraemia/meningitis were non-susceptible to penicillin (PNSP). Of these, only one isolate was additionally resistant to tetracycline. Susceptibility data to the most important anti-pneumococcal antibiotics are shown in Figure 4. Two laboratories reported zero episodes of *S. pneumoniae* bacteraemia during the quarter. No reports were received from two laboratories.

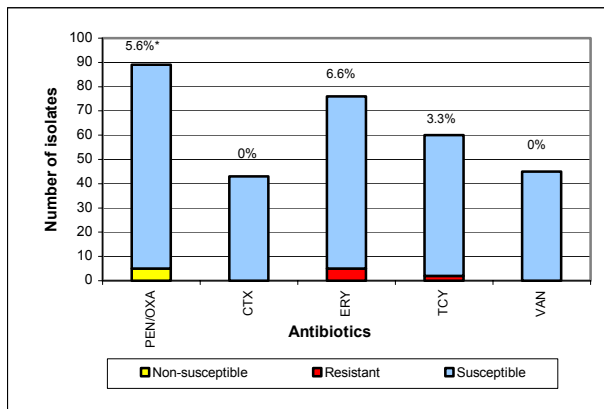


Figure 4. Susceptibility data for invasive isolates of *S. pneumoniae* reported in Q1 2002. Percentage resistance is indicated above the bar.

Antibiotic codes: PEN – penicillin, OXA – oxacillin, CTX – cefotaxime, ERY- erythromycin, TCY – tetracycline, VAN – vancomycin.

*EARSS includes both intermediate (low-level resistant) and resistant (high-level resistant) in the category non-susceptible.

In comparison, there were 90 isolates in Q1 2001 yielding 12.2% PNSP. The PNSP rate for the year 2001 was 12.2%.

Data from Pneumococcal Referral Laboratory

Sixty-five isolates were referred to RCSI/Beaumont. Four PNSP isolates exhibited low-level penicillin resistance (MIC 0.1-1.0mg/L). No isolate with high-level resistance (MIC ≥ 2 mg/L) to penicillin was detected. All 65 isolates exhibited cefotaxime MIC values of ≤ 1 mg/L and ciprofloxacin MIC values of ≤ 2 mg/L, which is interpreted as intermediate according to the latest BSAC criteria (there is no “susceptible” category for ciprofloxacin against *S. pneumoniae*).

No data were available on 15 isolates, including one determined to be non-susceptible (in-house Etest result for this isolate was 0.38mg/L).

Table 1. Susceptibility category based on MIC data on *S. pneumoniae* isolates (n=65) referred to RCSI/Beaumont during Q1 2002.

	MIC (mg/L)		
	S	I	R
Penicillin	≤ 0.06 61	0.12-1.0 4	≥ 2 0
Cefotaxime	≤ 1 65		≥ 2 0
Ciprofloxacin		≤ 2 65	≥ 4 0

The overall adherence to the protocol for penicillin, cefotaxime and ciprofloxacin MICs (required for PNSP isolates only, n=5) was 80%.

Escherichia coli

Routine susceptibility test results are submitted on the first invasive isolate (blood or CSF) per patient per quarter. Susceptibility data are required for ampicillin, a third-generation cephalosporin (cefotaxime or ceftriaxone and/or ceftazidime), ciprofloxacin and gentamicin. Testing for extended-spectrum beta-lactamase (ESBL) production is also required by the protocol.

In Q1 2002, data were submitted on 151 *E. coli* isolates (150 from blood and one from CSF) from 12 of the 17 hospitals participating in the surveillance of this pathogen. Three laboratories reported no isolates. No reports were received from two laboratories.

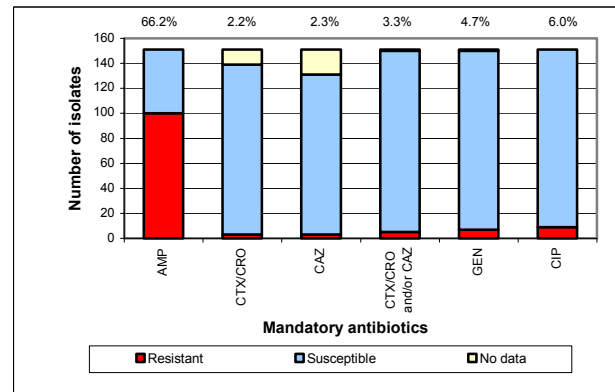


Figure 5. Susceptibility data to the mandatory antibiotics required by the EARSS protocol for invasive isolates of *E. coli* reported in Q1 2002. Percentage resistance, excluding isolates with no data, is indicated above the bar.

Antibiotic codes: AMP – ampicillin, CTX – cefotaxime, CRO – ceftriaxone, CAZ- ceftazidime, GEN – gentamicin, CIP – ciprofloxacin.

Three isolates from different hospitals were multiply-resistant to three or more of the antibiotics tested. One isolate was resistant to ampicillin, cefotaxime, ceftazidime and gentamicin; another was resistant to ampicillin, ciprofloxacin and gentamicin; and a further isolate was resistant to ampicillin, cefotaxime, ciprofloxacin and gentamicin. Of the 34 isolates tested, none were found to produce ESBLs.

Overall, the concordance with the EARSS protocol was excellent (Table 2). However, data on ESBL detection were available on just 34 isolates from four hospitals giving a concordance with the protocol of 20%.

Table 2. Percentage resistance (% R) among *E. coli* isolates (n=151) to the mandatory antibiotics and concordance with the EARSS protocol.

Mandatory Antibiotics	No. tested	No. R	% R	EARSS Concordance (%)
AMP	151	100	66.2	100
CTX/CRO	139	3	2.2	
CAZ	131	3	2.3	
CTX/CRO +/- CAZ	150	5	3.3	99.3
CIP	151	9	6.0	100
GEN	150	7	4.7	99.3

See legend for Figure 5 for explanation of antibiotic codes.

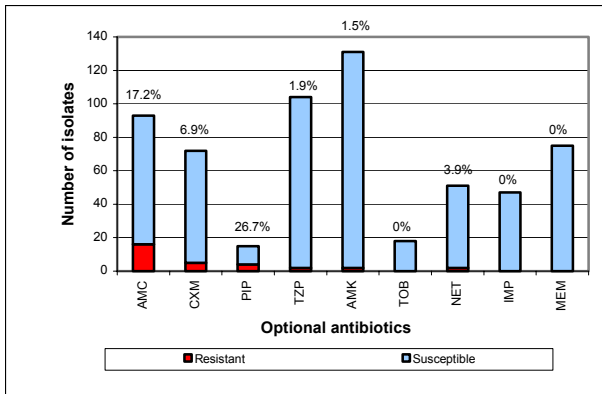


Figure 6. Susceptibility data to optional antibiotics for invasive isolates of *E. coli* reported in Q1 2002. Percentage resistance is indicated above the bar.

Antibiotic codes: AMC – amoxicillin/clavulanic acid, CXM – cefuroxime, PIP – piperacillin, TZP – piperacillin/tazobactam, AMK – amikacin, TOB – tobramycin, NET – netilmicin, IMP – imipenem, MEM – meropenem.

After just three months, the resistance rates observed in *E. coli* are generally low to moderate (with the exception of the ampicillin rate, which is consistently high throughout Europe) compared with the data for other countries reporting to EARSS in 2001.

Enterococcus faecalis

Routine susceptibility test results are submitted on the first invasive isolate (blood only) per patient per quarter. Susceptibility data are required for ampicillin, gentamicin (regular and/or high potency disc) and vancomycin.

In Q1 2002, data were submitted on 42 *E. faecalis* isolates from 10 of the 17 hospitals participating in the surveillance of this pathogen. Five laboratories reported no isolates. No reports were received from two laboratories.

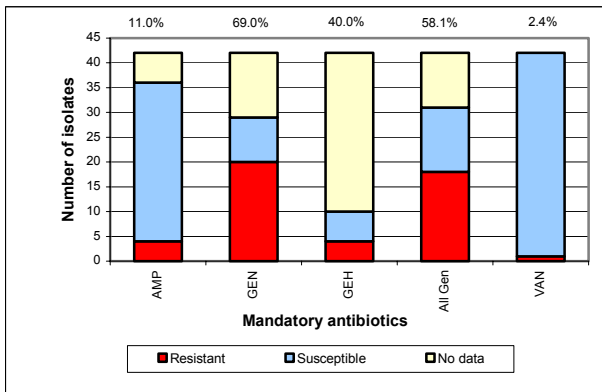


Figure 7. Susceptibility data to the mandatory antibiotics required by the EARSS protocol for invasive isolates of *E. faecalis* reported in Q1 2002. Percentage resistance, excluding isolates with no data, is indicated above the bar.

Antibiotic codes: AMP – ampicillin, GEN – gentamicin (low potency disc), GEH – gentamicin (high potency disc), All Gen – gentamicin (both low and high potency discs), VAN – vancomycin.

One isolate was resistant to ampicillin, gentamicin (low potency disc) and vancomycin but susceptible to teicoplanin. Four isolates with high-level resistance to gentamicin were reported from two hospitals (two isolates each). Overall, the concordance with the EARSS protocol was good (see Table 3).

Table 3. Percentage resistance (% R) among *E. faecalis* isolates (n=42) to the mandatory antibiotics and concordance with the EARSS protocol.

Mandatory Antibiotics	No. tested	No. R	% R	EARSS Concordance (%)
AMP	36	4	11.1	85.7
GEN	29	20	69.0	
GEH	10	4	40.0	
All Gen	31	18	58.1	73.8
VAN	42	1	2.4	100

See legend for Figure 7 for explanation of antibiotic codes.

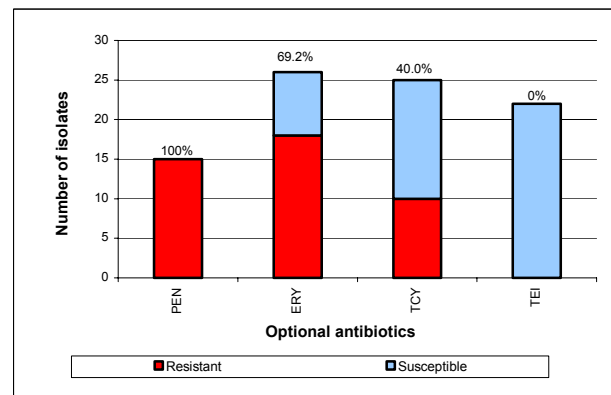


Figure 8. Susceptibility data to optional antibiotics for invasive isolates of *E. faecalis* reported in Q1 2002. Percentage resistance is indicated above the bar.

Antibiotic codes: PEN – penicillin, ERY – erythromycin, TCY – tetracycline, TEI – teicoplanin.

After just three months, the numbers of isolates are low but the resistance rates observed are in general consistent with the rates reported from other European countries reporting to EARSS in 2001 – low for vancomycin, moderate for ampicillin and high for gentamicin (both low and high potency discs).

Enterococcus faecium

Routine susceptibility test results are submitted on the first invasive isolate (blood only) per patient per quarter. Susceptibility data are required for ampicillin, gentamicin (regular and/or high potency disc) and vancomycin.

In Q1 2002, data were submitted on 20 *E. faecium* isolates from five of the 17 hospitals participating in the surveillance of this pathogen. Nine laboratories reported zero isolates. No reports were received from two laboratories.

One isolate was resistant to ampicillin and gentamicin (high disc potency); another was resistant to ampicillin, gentamicin (low disc potency) and vancomycin (no data available for teicoplanin); while a further isolate was resistant to both vancomycin and teicoplanin but susceptible to high levels of gentamicin. Overall, the concordance with the EARSS protocol was good (see Table 4).

EARSS News:

New Pathogens

The Irish EARSS Steering Group have reviewed and discussed the protocol for the new pathogens in light of the data submitted for Q1 2002.

We recommend that any *E. coli* isolates found to be resistant to any of the third generation cephalosporins (cefotaxime, ceftazidime or ceftriaxone) be sent for further investigations to Prof Martin Cormican and Dr Dearbhaile Morris at the National University of Ireland in Galway. They are happy to receive other isolates with resistance to other classes of antibiotics.

Enterococci are typically resistant to low levels of aminoglycosides due to poor drug uptake in the relatively anaerobic enterococcal environment. Higher levels of resistance are most commonly due to enzymatic degradation of the antibiotic. Therefore, when testing for aminoglycoside resistance in enterococci, high-potency discs (120µg according to NCCLS or 200µg according to BSAC/modified-Stokes) should be tested and not low-potency (10µg) discs. This predicts a synergistic bactericidal reaction between aminoglycosides and a cell wall-active drug, such as penicillin or vancomycin.

Referral of Pneumococci

As of 1st July, the Pneumococcal Referral Laboratory at Beaumont/RCSI will not be able to store or analyse further isolates of *S. pneumoniae* due to the retirement of Peadar Clarke and other changes in the department. The EARSS Steering Group advise laboratories to save all pneumococcal isolates if at all possible. It is hoped that this service will be resumed in the near future.

In the meantime, we request that results of locally-performed penicillin Etests (and cefotaxime if done), which are necessary to predict the therapeutic outcome, be reported on all isolates found to be non-susceptible to penicillin/oxacillin by routine disc diffusion.

EARSS Quality Assurance, 2002

An EARSS/UK-NEQAS/CRAB quality assurance exercise is planned for September this year and will include a total of five strains of the different pathogens under surveillance in EARSS. Packages containing the set of QA strains will be shipped to NDSC for further distribution to the participating laboratories. All results should be then submitted to NEQAS via the internet or Email by 4 October. NEQAS will report back to the participating laboratories in the usual manner as well as to the EARSS Management Team (EARSS-MT) in RIVM, who will then provide the National Representatives with the results for their country.

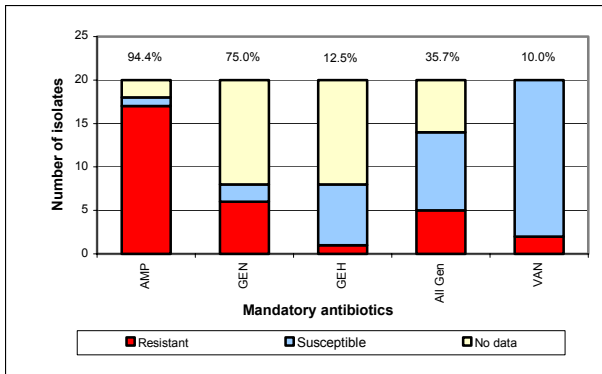


Figure 9. Susceptibility data to the mandatory antibiotics required by the EARSS protocol for invasive isolates of *E. faecium* reported in Q1 2002. Percentage resistance, excluding isolates with no data, is indicated above the bar. Antibiotic codes: AMP – ampicillin, GEN – gentamicin (low potency disc), GEH – gentamicin (high potency disc), All Gen – gentamicin (both low and high potency discs), VAN - vancomycin.

Table 4. Percentage resistance (% R) among *E. faecium* isolates (n=20) to the mandatory antibiotics and concordance with the EARSS protocol.

Mandatory Antibiotics	No. tested	No. R	% R	EARSS Concordance (%)
AMP	19	17	89.5	95
GEN	8	6	75.0	
GEH	8	1	12.5	
All Gen	14	5	35.7	70
VAN	20	2	10.0	100

See legend for Figure 9 for explanation of antibiotic codes.

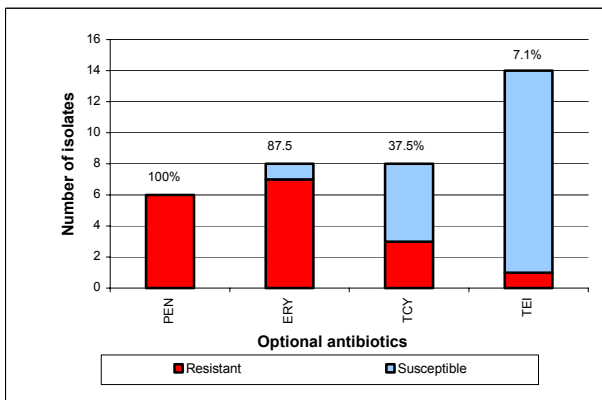


Figure 10. Susceptibility data to optional antibiotics for invasive isolates of *E. faecium* reported in Q1 2002. Percentage resistance is indicated above the bar.

Antibiotic codes: PEN – penicillin, ERY – erythromycin, TCY – tetracycline, TEI – teicoplanin.

After just three months, the numbers of isolates of *E. faecium* are too low to make any comparison with data from other European countries.

Prepared by Stephen Murchan and the EARSS Steering Committee (Prof Martin Cormican, Dr Robert Cunney, Dr Lynda Fenelon, Prof Hilary Humphreys, Prof Conor Keane, Dr Olive Murphy, Dr Darina O Flanagan and Dr Angela Rossney).

Participant Laboratories: Adelaide, Meath and National Children's Hospital, Tallaght; Beaumont Hospital, Dublin; Bon Secours Hospital, Cork; Bon Secours Hospital, Glasnevin; Cavan General Hospital; Cherry Orchard Hospital, Dublin; Cork University Hospital; Letterkenny General Hospital; Limerick Regional Hospital; Mater Misericordiae Hospital, Dublin; Mercy Hospital, Cork; Mullingar General Hospital; Our Lady's Hospital for Sick Children, Crumlin; Rotunda Hospital, Dublin; Sligo General Hospital; St Columille's Hospital, Loughlinstown; St James's Hospital, Dublin; St Vincent's Hospital, Dublin; Tralee General Hospital; Temple St Hospital, Dublin; University College Hospital, Galway; Waterford Regional Hospital.