



# EUROPEAN ANTIMICROBIAL RESISTANCE SURVEILLANCE SYSTEM (EARSS)



Quarter 1, 2004

June, 2004

## Key points

- *S. aureus*: MRSA 42.2% (Q4 2003, 41.2%)
- *S. pneumoniae*: PNSP 12.1% (Q4 2003, 6.5%)
- *E. coli*: 2.6% resistant to third-generation cephalosporins (3GCs) (Q4 2003, 1.6%); 7.5% to ciprofloxacin (Q4 2003, 11.7%); 2.9% to gentamicin (Q4 2003, 5.6%)  
One isolate reported with multiple-resistance to ampicillin, 3GCs (ESBL-negative), ciprofloxacin and gentamicin  
ESBLs detected in 2 isolates (1.1%)
- *E. faecalis*: vancomycin resistance (VRE) 1.9% (Q4 2003, 0%); high-level gentamicin (HLG) resistance: 32.7% (Q4 2003, 22.9%)
- *E. faecium*: VRE 17.9% (Q4 2003, 29.0%); HLG resistance 56.9% (Q4 2003, 46.7%)  
Seven isolates reported with multiple-resistance to ampicillin, HLG and vancomycin

## Data analysis

In Quarter 1 (Q1) 2004, 33 laboratories participated in the surveillance of *Staphylococcus aureus* and *Streptococcus pneumoniae*, while 32 participated in the surveillance of *Escherichia coli* and *Enterococcus faecalis/E. faecium*. The laboratories currently participating in EARSS in Ireland are listed at the end of this newsletter.

### *Staphylococcus aureus*

Routine susceptibility test results are submitted on the first invasive isolate (blood only) per patient per quarter. Susceptibility data are required for methicillin or oxacillin. All methicillin-resistant *S. aureus* (MRSA) isolates are referred to the National MRSA Reference Laboratory (NMRSARL) at St. James's Hospital, where minimum inhibitory concentrations (MICs) of oxacillin and vancomycin are performed.

#### Data from Participating Laboratories

In Q1 2004, data were submitted on 308 *S. aureus* isolates from 28 of the 33 laboratories participating in the surveillance of this pathogen. Of these, 130 (42.2%) were resistant to methicillin/oxacillin. Susceptibility data to the most important anti-staphylococcal antibiotics for all *S. aureus* isolates are shown in Figure 1.

In comparison, there were 272 isolates in Q1 2003 yielding 40.4% MRSA. The proportion of MRSA among *S. aureus* isolates for the year 2003 was 42.1%.

#### Data from National MRSA Reference Laboratory

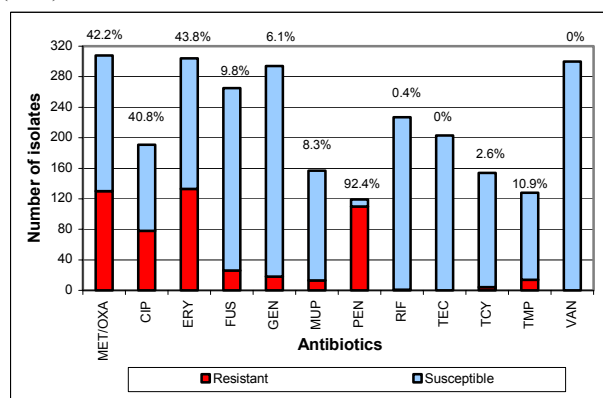
Of the above 130 MRSA isolates, 117 were referred to the NMRSARL for further evaluation, along with one additional isolate (a second strain of MRSA from the same specimen with

a different antibiogram). No NMRSARL data were available on 13 isolates reported to EARSS at NDSC. Antibiogram results are shown in Figure 2.

MIC results (determined by Etest) were available on 118 isolates. The majority (84%, n=99) exhibited oxacillin MICs of >256 mg/L. All isolates exhibited vancomycin MICs of ≤4mg/L.

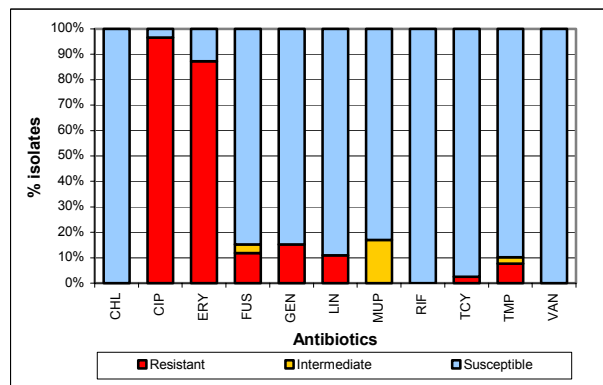
In addition to the 117 EARSS isolates referred to the NMRSARL, in-house oxacillin MICs were available for three isolates not referred.

The overall adherence to the protocol for oxacillin and vancomycin MICs (required for MRSA isolates only, n=130) was 90% (n=117), which is higher than that reported in Q4 2003 (86%).



**Figure 1.** Susceptibility data for all invasive isolates of *S. aureus* (MRSA and MSSA) reported in Q1 2004. Percentage resistance is indicated above the bars.

Antibiotic codes: MET, methicillin; OXA, oxacillin; CIP, ciprofloxacin; ERY, erythromycin; FUS, fusidic acid; GEN, gentamicin; MUP, mupirocin; PEN, penicillin; RIF, rifampicin; TEC, teicoplanin; TCY, tetracycline; TMP, trimethoprim; VAN, vancomycin.

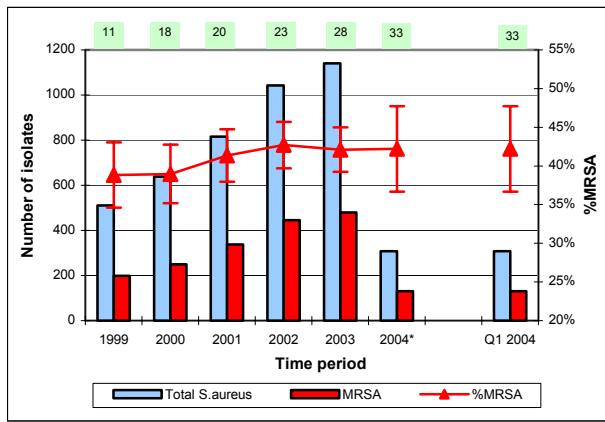


**Figure 2.** Antibiogram results for MRSA isolates (n=118) referred to NMRSARL in Q1 2004.

Antibiotic codes: CHL, chloramphenicol; LIN, lincomycin. See legend for Figure 1 for explanation of other antibiotic codes.

#### *S. aureus* trends

The proportion of MRSA among *S. aureus* isolates observed in Q1 2004 (42.2%) was slightly higher than that observed in Q4 2003 (41.2%). See Figure 3 for comparison with annual proportions for 1999-2003.



**Figure 3.** Trends for *S. aureus* – total numbers of *S. aureus*/MRSA and percentage MRSA with 95% confidence intervals. The numbers of participating laboratories by year-end are indicated above the bars (\*up to Q1 only for 2004)

### *Streptococcus pneumoniae*

Routine susceptibility test results are submitted on the first invasive isolate (blood or CSF) per patient per quarter. Susceptibility data are required for penicillin or oxacillin and erythromycin. Laboratories are also asked to report on in-house MIC results for penicillin and cefotaxime or ceftriaxone, if available, on all penicillin-non-susceptible *S. pneumoniae* (PNSP) isolates.

In Q1 2004, data were submitted on 132 *S. pneumoniae* isolates (all from blood) from 26 of the 33 laboratories participating in the surveillance of this pathogen. Of these, 16 (12.1%) were non-susceptible to penicillin. Twenty-one of 129 isolates (16.3%) tested were resistant to erythromycin. Susceptibility data to the most important anti-pneumococcal antibiotics are shown in Figure 4.

In comparison, there were 111 isolates in Q1 2003 yielding 13.5% PNSP. The proportion of PNSP among *S. pneumoniae* isolates for the year 2003 was 11.8%.

#### Penicillin non-susceptibility and resistance to other drugs

Of the 16 PNSP isolates reported in this quarter, penicillin and cefotaxime/ceftriaxone Etest results were available for 15 and ten isolates, respectively. One isolate exhibited high-level resistance (HLR) to penicillin (MIC  $\geq 2.0$  mg/L) while four isolates were determined to have intermediate resistance (MIC 0.12–1.0 mg/L). Intermediate resistance to cefotaxime was detected in two isolates, one with HLR and one with intermediate resistance to penicillin. Five PNSP and 16 penicillin-susceptible isolates were erythromycin-resistant.

The overall adherence to the protocol for penicillin and cefotaxime/ceftriaxone MICs, which are required for PNSP isolates (n=16), was 63%, which is down on Q4 2003 (83%). This excludes ciprofloxacin MICs, which are also required by the protocol but are not routinely tested in Irish laboratories.

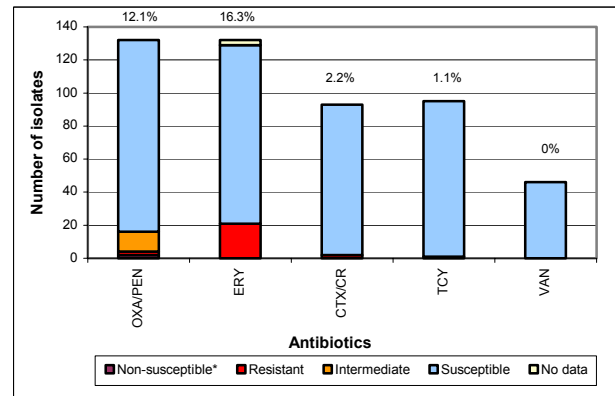
#### Age and sex breakdown

Analysis of the pneumococcal data in Q1 2004 shows that 24 isolates (18%) were from children aged 0–4 years and 72 isolates (55%) were from adults >50 years. Of the 132 pneumococcal isolates, 64 (50%) were from males and 65 (50%) were from females.

#### *S. pneumoniae* trends

The proportion of PNSP among *S. pneumoniae* isolates observed in Q1 2004 (12.1%) was up from that observed in Q4

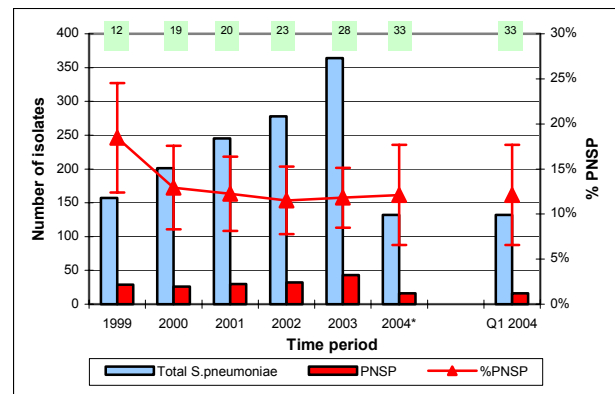
2003 (6.5%). See Figure 5 for comparison with annual proportions for 1999–2003.



**Figure 4.** Susceptibility data for invasive isolates of *S. pneumoniae* reported in Q1 2004. Percentage non-susceptible/resistance is indicated above the bars.

Antibiotic codes: OXA, oxacillin; PEN, penicillin; ERY, erythromycin; CTX, cefotaxime; CRO, ceftriaxone; TCY, tetracycline; VAN, vancomycin.

\*Level of susceptibility not determined.



**Figure 5.** Trends for *S. pneumoniae* – total numbers of *S. pneumoniae*/PNSP and percentage PNSP with 95% confidence intervals.

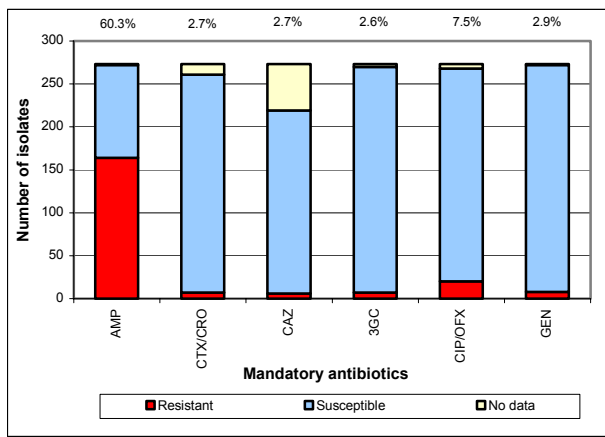
The numbers of participating laboratories by year-end are indicated above the bars (\*up to Q1 only for 2004)

### *Escherichia coli*

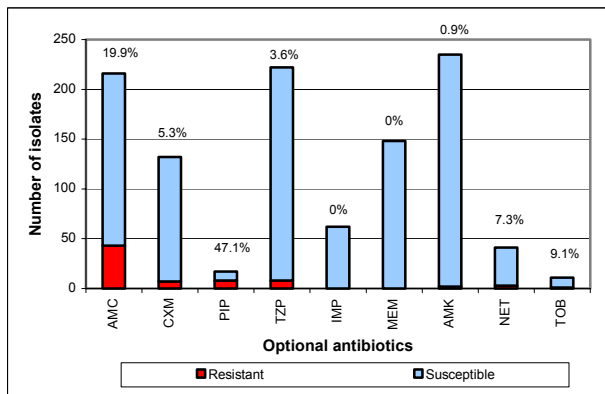
Routine susceptibility test results are submitted on the first invasive isolate (blood or CSF) per patient per quarter. Susceptibility data are required for a broad-spectrum penicillin (ampicillin), a third-generation cephalosporin (3GC; cefotaxime or ceftriaxone and/or ceftazidime), a fluoroquinolone (ciprofloxacin or ofloxacin) and an aminoglycoside (gentamicin). Testing for extended-spectrum beta-lactamase (ESBL) production is also required by the protocol.

In Q1 2004, data were submitted on 273 *E. coli* isolates (all from blood) from 25 of the 32 laboratories participating in the surveillance of this pathogen. Susceptibility data to mandatory (required by the protocol) and other antibiotics are shown in Figures 6 and 7, respectively.

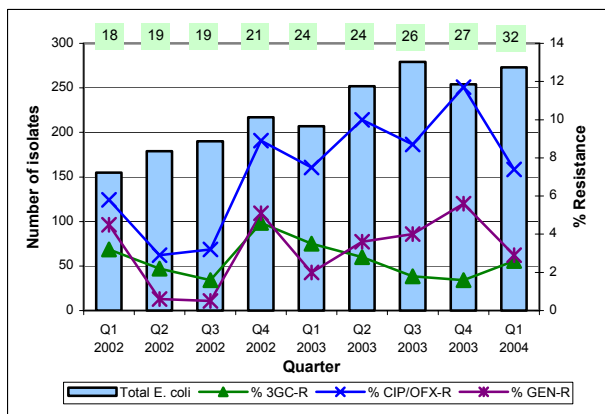
Nine isolates from six laboratories exhibited multiple-resistance (defined as resistance to three or more of the mandatory antibiotic classes tested): one was resistant to ampicillin, 3GCs ciprofloxacin and gentamicin; five isolates were resistant to ampicillin, ciprofloxacin and gentamicin and three isolates were resistant to ampicillin, 3GCs and ciprofloxacin.



**Figure 6.** Susceptibility data to the mandatory antibiotics required by the EARSS protocol for invasive isolates of *E. coli* reported in Q1 2004. Percentage resistance, excluding isolates with no data, is indicated above the bars. Antibiotic codes: AMP, ampicillin; CTX, cefotaxime; CRO, ceftriaxone; CAZ, ceftazidime; 3GC, Any third-generation cephalosporin; CIP, ciprofloxacin; OFX, ofloxacin; GEN, gentamicin.



**Figure 7.** Susceptibility data to other antibiotics for invasive isolates of *E. coli* reported in Q1 2004. Percentage resistance is indicated above the bars. Antibiotic codes: AMC, amoxicillin/clavulanic acid; CXM, cefuroxime; PIP, piperacillin; TZP, piperacillin/tazobactam; IMP, imipenem; MEM, meropenem; AMK, amikacin; NET, netilmicin; TOB, tobramycin.



**Figure 8.** Trends for *E. coli* – total numbers of *E. coli* and percentage resistance to third-generation cephalosporins (3GC), ciprofloxacin/ofloxacin (CIP/OFX) and gentamicin (GEN). Numbers of participating laboratories are indicated above the bars.

Overall, the concordance with the EARSS protocol (excluding ESBL detection) was 98%, which is the same as that reported in Q4 2003. Data on ESBL detection were available on 189 isolates from 21 laboratories giving a concordance of 69% (Q4 2003, 66%). Seventeen laboratories reported ESBL data on all or most of their *E. coli* isolates while a further four laboratories reported ESBL data on all or most of their ampicillin-resistant isolates. Of the 189 isolates tested, two were found to be ESBL-producers (1.1%).

***E. coli* trends**

In Q1 2004, 7.5% of isolates were resistant to ciprofloxacin, which represents a decrease on the 11.7% observed in Q4 2003. The proportion of resistance to gentamicin also decreased from 5.6% in Q4 2003 to 2.9% in Q1 2004, while the proportion of resistance to 3GCs increased from 1.6% to 2.6% over the same period (see Figure 8).

***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, high-level gentamicin (HLG) and vancomycin.

In Q1 2004, data were submitted on 53 *E. faecalis* isolates from 13 of the 32 laboratories participating in the surveillance of this pathogen. Antibiotic susceptibility data are shown in Figure 9.

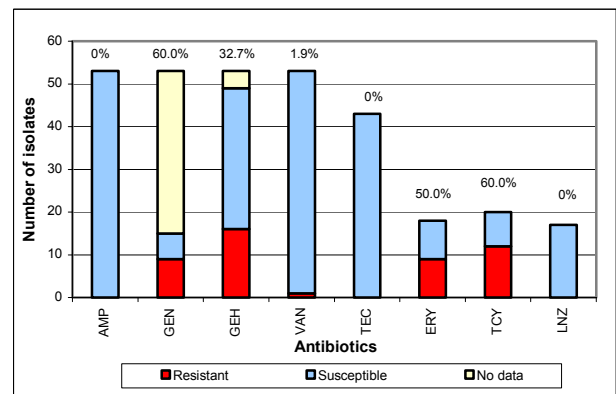
No isolates were reported to be ampicillin-resistant in this quarter. *E. faecalis* are typically ampicillin-susceptible so previous reports of these may have represented misidentification of the isolates as speciation of enterococci can be problematic.

One isolate with resistance to both vancomycin and HLG was reported in this quarter.

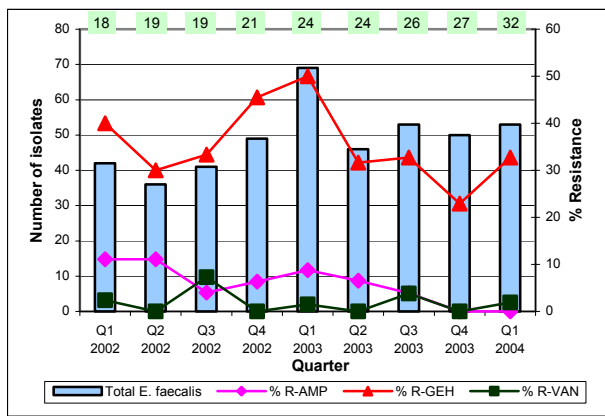
Overall, the concordance with the EARSS protocol was 93%. This represents a decrease from 96% in Q4 2003.

***E. faecalis* trends**

In Q1 2004, 1.9% of *E. faecalis* isolates were vancomycin-resistant compared with 0% in the previous quarter. Over the same period, the proportion of isolates that were resistant to high-level gentamicin increased from 22.9% to 32.7% (see Figure 10).



**Figure 9.** Susceptibility data for invasive isolates of *E. faecalis* reported in Q1 2004. Percentage resistance, excluding isolates with no data, is indicated above the bars. Antibiotic codes: AMP, ampicillin; GEN, gentamicin (low potency disc); GEH, gentamicin (high potency disc); VAN, vancomycin; TEC, teicoplanin; ERY, erythromycin; TCY, tetracycline; LNZ, linezolid.

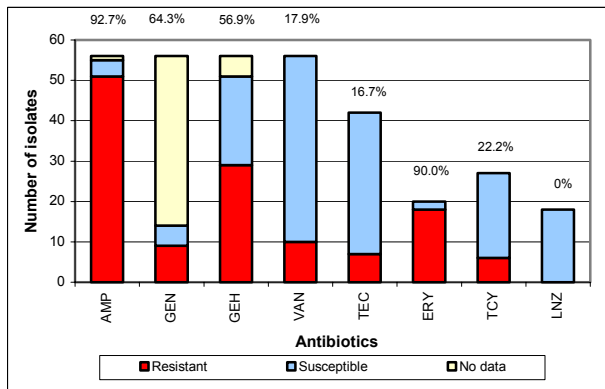


**Figure 10.** Trends for *E. faecalis* – total numbers of *E. faecalis* and percentage resistance to ampicillin (AMP), high-level gentamicin (GEH) and vancomycin (VAN). Numbers of participating laboratories are indicated above the bars.

### *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, high-level gentamicin and vancomycin.

In Q1 2004, data were submitted on 56 *E. faecium* isolates from 14 of the 32 laboratories participating in the surveillance of this pathogen. Antibiotic susceptibility data are shown in Figure 11.



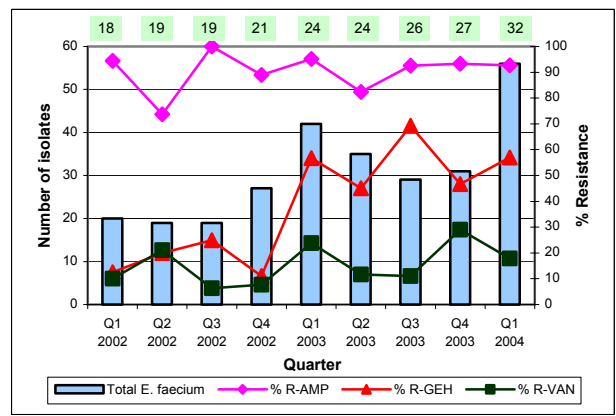
**Figure 11.** Susceptibility data to the mandatory antibiotics required by the EARSS protocol for invasive isolates of *E. faecium* reported in Q1 2004. Percentage resistance, excluding isolates with no data, is indicated above the bars. See legend for Figure 9 for explanation of antibiotic codes.

Seven isolates from five laboratories were reported with multiple-resistance to ampicillin, HLG and vancomycin in Q1 2004.

Overall, the concordance with the EARSS protocol was 91%. This represents a decrease from 97% in Q4 2003.

#### *E. faecium* trends

In Q1 2004, the proportion of *E. faecium* isolates reported to be vancomycin-resistant was 17.9%, which represents a decrease on the 29.0% reported in the previous quarter. Over the same period the proportion resistant to high-level gentamicin increased from 46.7% to 56.9% (see Figure 12). The proportion of isolates resistant to ampicillin (92.7%) was similar to that observed in Q4 (93.3%).



**Figure 12.** Trends for *E. faecium* – total numbers of *E. faecium* and percentage resistance to ampicillin (AMP), high-level gentamicin (GEH) and vancomycin (VAN). Numbers of participating laboratories are indicated above the bars.

## EARSS News

### Welcome to new EARSS labs

We would like to welcome four new laboratories to EARSS as of January 1<sup>st</sup> 2004: The Blackrock Clinic; Mount Carmel Hospital, Churchtown; Naas General Hospital; and St Luke's Hospital, Rathgar.

### EARSS manual 2004

EARSS in the Netherlands has recently produced an updated EARSS Manual for 2004. The most relevant sections to laboratories will soon be circulated to all EARSS participants.

### EARSS EQA exercise, 2004

The annual EARSS external quality assurance exercise will take place later this year. Six strains will be distributed to all participating EARSS laboratories during the second week of September and laboratories will have three weeks in which to process and report their findings to UK-NEQAS, who are once again organising the exercise on behalf of EARSS.

### Joint EARSS-BSAC meeting on antimicrobial resistance in October

A one-day meeting on antimicrobial resistance will be held on Friday 15th October in the Mont Clare Hotel, Dublin. The meeting is being jointly organised with the British Society for Antimicrobial Chemotherapy (BSAC) and will feature a series of keynote addresses by international speakers, as well as an update on EARSS and antimicrobial resistance surveillance in Ireland. Further details will be circulated to EARSS participants in the coming months.

**Prepared by:** Stephen Murchan and the EARSS Steering Group (Prof Martin Cormican, Dr Robert Cunney, Mr Frank Dennehy, Dr Lynda Fenelon, Prof Hilary Humphreys, Dr Derval Igoe, Dr Olive Murphy, Dr Brian O'Connell and Dr Angela Rossney).

**Participating Laboratories:** Adelaide, Meath & National Children's, Tallaght; Beaumont, Dublin; Blackrock Clinic; Bon Secours, Cork; Bon Secours, Glasnevin; Coombe Women's, Dublin; Cavan General; Cherry Orchard, Dublin; Cork University; James Connolly Memorial, Blanchardstown; Letterkenny General; Mater Misericordiae, Dublin; Mercy, Cork; Mayo General, Castlebar; Midland Regional, Mullingar; Midland Regional, Portlaoise; Mid-Western Regional, Limerick; Mount Carmel, Churchtown; Naas General; Our Lady of Lourdes, Drogheda; Our Lady's Hospital for Sick Children, Crumlin; Portiuncula, Ballinasloe; Rotunda, Dublin; Sligo General; St Columcille's, Loughlinstown; St James's, Dublin; St Luke's, Rathgar; St Michael's, Dun Laoghaire; St Vincent's University, Dublin; Tralee General; Temple St Children's University, Dublin; University College, Galway; Waterford Regional.