EUROPEAN ANTIMICROBIAL RESISTANCE SURVEILLANCE SYSTEM (EARSS)

Quarter 4, 2003 March, 2004

Key points

- *S. aureus*: MRSA 41.2% (Q3 2003, 40.3%)
- *S. pneumoniae*: PNSP 6.5% (Q3 2003, 12.5%)
- *E. coli*: 1.6% resistant to third-generation cephalosporins (3GCs) (Q3 2003, 1.8%); 11.7% to ciprofloxacin (Q3 2003, 8.7%); 5.6% to gentamicin (Q3 2003, 4.0%)
  One isolate with multiple-resistance to ampicillin, 3GCs (ESBL-positive), ciprofloxacin and gentamicin
  ESBLs detected in 2 isolates (1.2%)
- *E. faecalis:* vancomycin resistance (VRE) 0% (Q3 2003, 3.8%); high-level gentamicin (HLG) resistance: 22.9% (Q3 2003, 32.7%)
- *E. faecium:* VRE 29.0% (Q3 2003, 11.1%); HLG resistance 46.7% (Q3 2003, 69.2%)

Data analysis

In Quarter 4 (Q4) 2003, 28 laboratories participated in the surveillance of *Staphylococcus aureus* and *Streptococcus pneumoniae*, while 27 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 Q4 2003, data were submitted on 308 *S. aureus* isolates from 24 of the 28 laboratories participating in the surveillance of this pathogen. Of these, 127 (41.2%) 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 276 isolates in Q4 2002 yielding 41.7% MRSA. The proportion of MRSA among *S. aureus* isolates for the year 2002 was 42.7%.

Data from National MRSA Reference Laboratory

Of the above 127 MRSA isolates, 105 were referred to the NMRSARL for further evaluation, along with three additional isolates (e.g. MRSA isolated subsequent to MSSA or second strains of MRSA with a different antibiogram from the same specimen/patient). No NMRSARL data were available on 22 isolates reported to EARSS at NDSC. Antibiogram results are shown in Figure 2.

MIC results (determined by Etest) were available on 108 isolates. The majority (92%, n=99) exhibited oxacillin MICs of >256 mg/L. All isolates exhibited vancomycin MICs of ≤4mg/L.

In addition to the 108 EARSS isolates referred to the NMRSARL, in-house MICs were available for eleven isolates not referred: for oxacillin and vancomycin, n=2; for oxacillin only, n=7; and for vancomycin only, n=2.

The overall adherence to the protocol for oxacillin and vancomycin MICs (required for MRSA isolates only, n=127) was 84% (n=107), which is lower than that reported in Q3 2003 (93%).

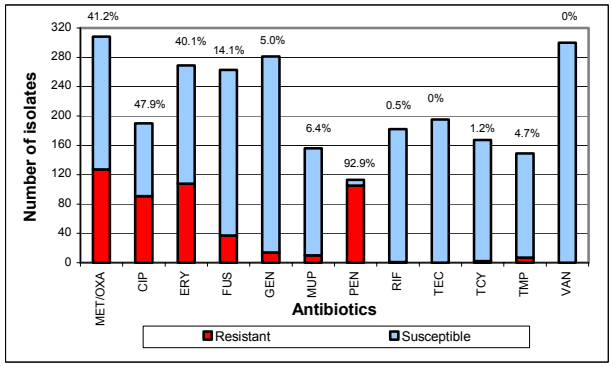

Figure 1. Susceptibility data for all invasive isolates of *S. aureus* (MRSA and MSSA) reported in Q4 2003. Percentage resistance is indicated above the bars.
Antibiotic codes: MET, methicillin; OXA, oxacillin; CIP, ciprofloxacin; ERY, erythromycin; FUS, fusidic acid; GEN, gentamicin; MUP, mupirocin; PEN, penicillin; RIF, rifampicin; TEC, teicoplanin; TCY, tetracycline; TMP, trimethoprim; VAN, vancomycin.

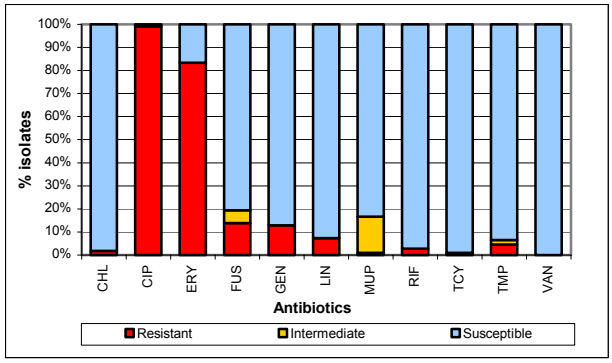

Figure 2. Antibiogram results for MRSA isolates (n=108) referred to NMRSARL in Q4 2003.
Antibiotic codes: CHL, chloramphenicol; LIN, lincomycin. See legend for Figure 1 for explanation of other antibiotic codes.

***S. aureus* trends**

The proportion of MRSA among *S. aureus* isolates observed in Q4 2003 (41.2%) was slightly higher than that observed in Q3 2003 (40.3%). See Figure 3 for comparison with annual proportions for 1999-2002.

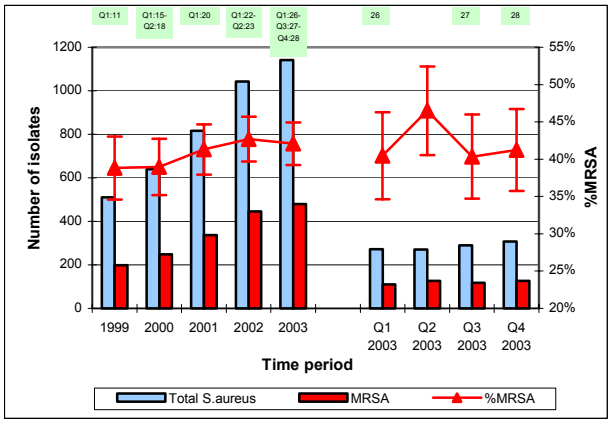

Figure 3. Trends for *S. aureus* – total numbers of *S. aureus* /MRSA and percentage MRSA with 95% confidence intervals.
Changes in the numbers of participating laboratories are indicated above the bars.

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 Q4 2003, data were submitted on 93 *S. pneumoniae* isolates (92 from blood and one from CSF) from 21 of the 28 laboratories participating in the surveillance of this pathogen. Of these, six (6.5%) were non-susceptible to penicillin. Nine of 83 isolates (10.8%) tested were resistant to erythromycin. Susceptibility data to the most important anti-pneumococcal antibiotics are shown in Figure 4.

In comparison, there were 72 isolates in Q4 2002 yielding 13.9% PNSP. The proportion of PNSP among *S. pneumoniae* isolates for the year 2002 was 11.5%.

Penicillin non-susceptibility and resistance to other drugs

Of the six PNSP isolates (five from blood, one from CSF) reported in this quarter, penicillin and cefotaxime/ceftriaxone Etest results were available for five isolates. One isolate exhibited high-level resistance to penicillin (MIC ≥2.0 mg/L) while four isolates, including one from CSF, were determined to have intermediate resistance (MIC 0.12–1.0 mg/L). No resistance to cefotaxime was detected this quarter. One PNSP and eight 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=6), was 83%, the same as in Q3 2003. 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 Q4 2003 shows that 16 isolates (17%) were from children aged 0–4 years and 56 isolates (60%) were from adults >50 years. Of the 93 pneumococcal isolates, 53 (57%) were from males and 39 (43%) were from females.

***S. pneumoniae* trends**

The proportion of PNSP among *S. pneumoniae* isolates observed in Q4 2003 (6.5%) was down from that observed in Q3 2003 (12.5%). See Figure 5 for comparison with annual proportions for 1999-2002.

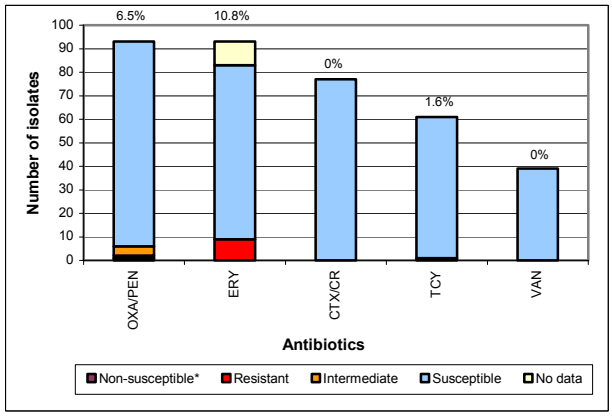

Figure 4. Susceptibility data for invasive isolates of *S. pneumoniae* reported in Q4 2003. Percentage resistance is indicated above the bars.
Antibiotic codes: OXA, oxacillin; PEN, penicillin; ERY, erythromycin; CTX, cefotaxime; CRO, ceftriaxone; TCY, tetracycline; VAN, vancomycin.
*EARSS includes both intermediate and high-level resistant in the category non-susceptible.

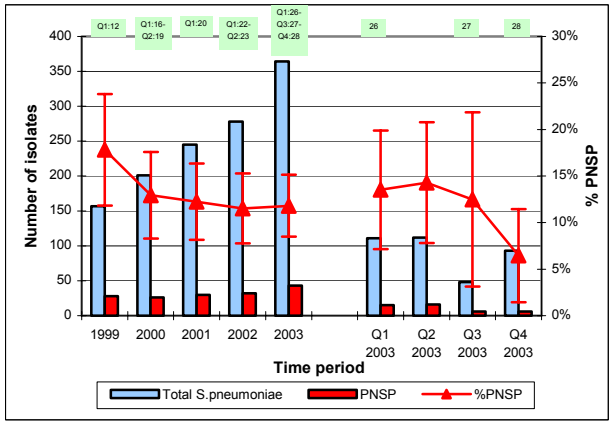

Figure 5. Trends for *S. pneumoniae* – total numbers of *S. pneumoniae*/PNSP and percentage PNSP with 95% confidence intervals.
Changes in the numbers of participating laboratories are indicated above the bars.

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 Q4 2003, data were submitted on 253 *E. coli* isolates (all from blood) from 25 of the 27 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.

Thirteen isolates, from five laboratories, exhibited multiple-resistance (defined as resistance to three or more of the mandatory antibiotic classes tested): one was resistant to ampicillin, 3GCs (both ESBL-positive) ciprofloxacin and gentamicin; 11 isolates were resistant to ampicillin, ciprofloxacin and gentamicin and one isolate was resistant to ampicillin, 3GCs and ciprofloxacin.

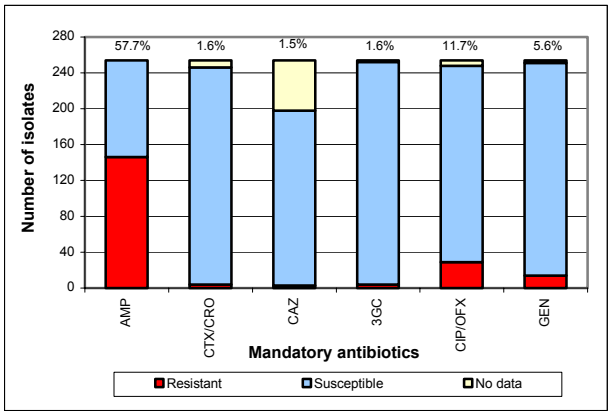

Figure 6. Susceptibility data to the mandatory antibiotics required by the EARSS protocol for invasive isolates of *E. coli* reported in Q4 2003. Percentage resistance, excluding isolates with no data, is indicated above the bars.
Antibiotic codes: AMP, ampicillin; CTX, cefotaxime; CRO, ceftriaxone; CAZ, ceftazidime; 3GC, Any third-generation cephalosporin; CIP, ciprofloxacin; OFX, ofloxacin; GEN, gentamicin.

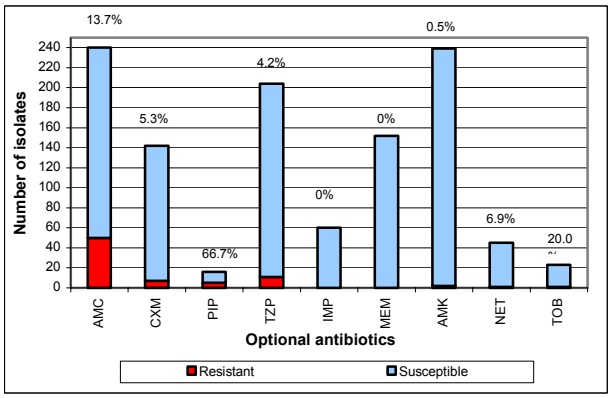

Figure 7. Susceptibility data to other antibiotics for invasive isolates of *E. coli* reported in Q4 2003. Percentage resistance is indicated above the bars.
Antibiotic codes: AMC, amoxicillin/clavulanic acid; CXM, cefuroxime; PIP, piperacillin; TZP, piperacillin/tazobactam; IMP, imipenem; MEM, meropenem; AMK, amikacin; NET, netilmicin; TOB, tobramycin.

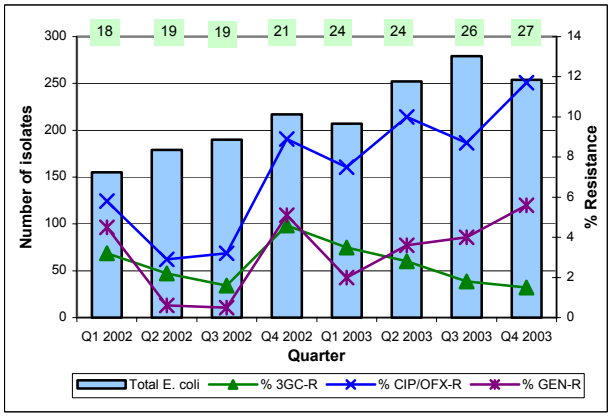

Figure 8. Trends for E. coli – total numbers of E. coli and percentage resistance to third-generation cephalosporins (3GC), ciprofloxacin/ofloxacin (CIP/OFX) and gentamicin (GEN).
Numbers of participating laboratories are indicated above the bars.

Overall, the concordance with the EARSS protocol (excluding ESBL detection) was 98%, which is down slightly from that reported in Q3 2003 (99%). Data on ESBL detection were available on 166 isolates from 20 laboratories giving a concordance of 66% (Q3 2003, 65%). Fifteen laboratories reported ESBL data on all or most of their *E. coli* isolates while a further three laboratories reported ESBL data on all or most of their ampicillin-resistant isolates. Of the 166 isolates tested, two were found to be ESBL-producers (1.2%).

***E. coli* trends**

In Q4 2003, 11.7% of isolates were resistant to ciprofloxacin, which represents an increase on the 8.7% observed in Q3 2003 and is the highest proportion observed over the two years of surveillance of this pathogen. The proportion of resistance to gentamicin also increased from 4.0% in Q3 2003 to 5.6% in Q4 2003, while the proportion of resistance to 3GCs decreased marginally from 1.8% to 1.6% 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 Q4 2003, data were submitted on 50 *E. faecalis* isolates from 16 of the 27 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.

No isolates with resistance to both vancomycin and HLG were reported in this quarter.

Overall, the concordance with the EARSS protocol was 96%. This represents an increase from 93% in Q3 2003.

***E. faecalis* trends**

In Q4 2003, no vancomycin-resistant isolates *E. faecalis* were reported compared with 3.8% of isolates in the previous quarter. Over the same period, the proportion of isolates that were resistant to high-level gentamicin decreased from 32.7% to 22.9%. For the first time since surveillance of this pathogen started, no ampicillin-resistant isolates were reported (see Figure 10).

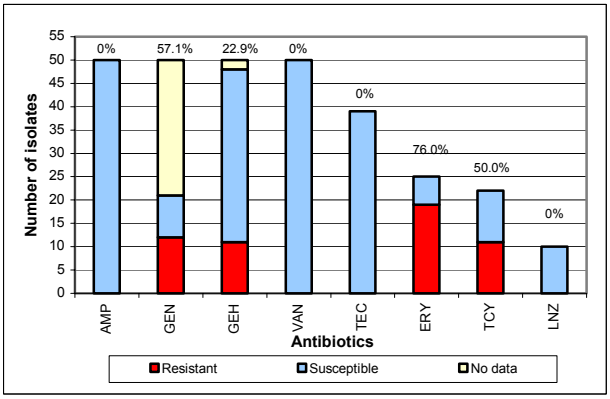

Figure 9. Susceptibility data for invasive isolates of *E. faecalis* reported in Q4 2003. Percentage resistance, excluding isolates with no data, is indicated above the bars.
Antibiotic codes: AMP, ampicillin; GEN, gentamicin (low potency disc); GEH, gentamicin (high potency disc); VAN, vancomycin; TEC, teicoplanin; ERY, erythromycin; TCY, tetracycline; LNZ, linezolid.

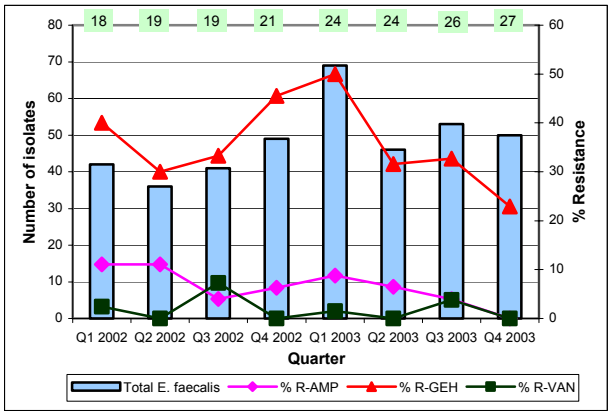

Figure 10. Trends for *E. faecalis* – total numbers of *E. faecalis* and percentage resistance to ampicillin (AMP), high-level gentamicin (GEH) and vancomycin (VAN).
Numbers of participating laboratories are indicated above the bars.

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 Q4 2003, data were submitted on 31 *E. faecium* isolates from 13 of the 27 laboratories participating in the surveillance of this pathogen. Antibiotic susceptibility data are shown in Figure 11.

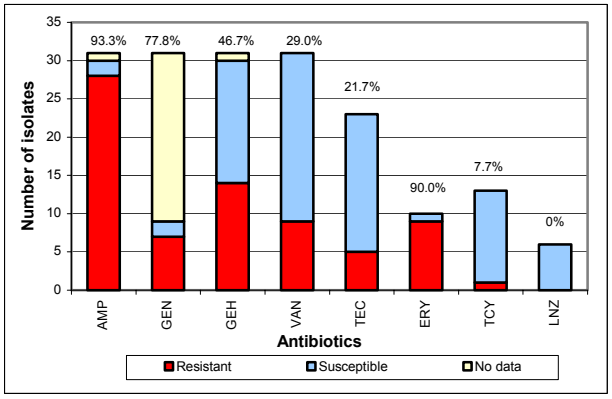

Figure 11. Susceptibility data to the mandatory antibiotics required by the EARSS protocol for invasive isolates of *E. faecium* reported in Q4 2003. Percentage resistance, excluding isolates with no data, is indicated above the bars.
See legend for Figure 9 for explanation of antibiotic codes.

Five isolates from three laboratories were reported with multiple-resistance to ampicillin, HLG and vancomycin in Q4 2003.

Overall, the concordance with the EARSS protocol was 97%, which is the similar to the previous quarter (96%).

E. faecium trends

In Q4 2003, the proportion of *E. faecium* isolates reported to be vancomycin-resistant was 29.0%, which represents an increase on the 11.1% reported in the previous quarter. Over the same period the proportion resistant to high-level gentamicin decreased from 69.2% to 46.7% (see Figure 12). The proportion of isolates resistant to ampicillin (93.3%) was similar to that observed in Q3 (92.6%).

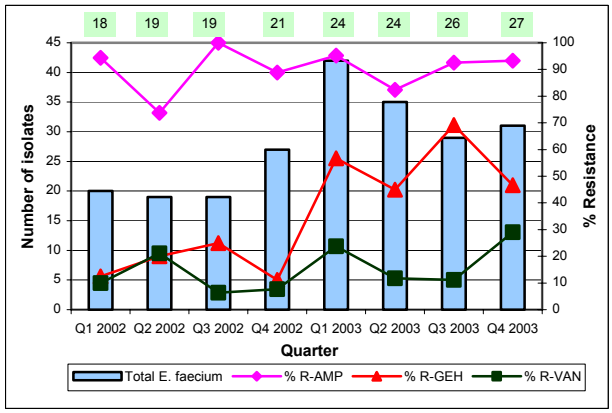

Figure 12. Trends for *E. faecium* – total numbers of *E. faecium* and percentage resistance to ampicillin (AMP), high-level gentamicin (GEH) and vancomycin (VAN).
Numbers of participating laboratories are indicated above the bars.

EARSS News

Amendment to the Infectious Diseases Legislation, 2003

The recent amendment to the Infectious Diseases Regulations 1981 *(Infectious Diseases (Amendment) (No.3) Regulations 2003, S.I. No. 707)* has resulted in the inclusion of the five European Antimicrobial Resistance Surveillance System (EARSS) pathogens (*Staphylococcus aureus*, *Streptococcus pneumoniae*, *Escherichia coli* and the enterococci, *Enterococcus faecalis* and *E. faecium*) to the list of diseases that are notifiable. This is an important step in further strengthening the monitoring and control of antimicrobial resistance in Ireland. The Directors of Public Health, to whom all notifiable disease should be reported, have agreed that data on the EARSS pathogens should continue to be reported directly to NDSC in accordance with currently agreed EARSS protocol. All laboratories in the Ireland are now required to submit data on these pathogens and we are happy to assist laboratories new to EARSS to ensure their participation in this project is as straightforward as possible.

EARSS Resources

An updated version of the EARSS Antimicrobial Susceptibility Testing Issues document has been placed on the EARSS page of the NDSC website, along with the report on the EARSS EQA exercise for 2003.

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Participating Laboratories: Adelaide, Meath & National Children's, Tallaght; Beaumont, Dublin; Bon Secours, Cork; Bon Secours, Glasnevin; The 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; Our Lady of Lourdes, Drogheda; Our Lady's Hospital for Sick Children, Crumlin; Rotunda, Dublin; Sligo General; St Columcille's, Loughlinstown; St James's, Dublin; St Michael's, Dun Laoghaire; St Vincent's University, Dublin; Tralee General; Temple St Children's University, Dublin; University College, Galway; Waterford Regional.