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Immunisation Uptake in Ireland, 2006

Introduction

The current Irish childhood immunisation schedule recommends that babies receive one dose of vaccine against tuberculosis (BCG vaccine) at birth[1] or by one month of age and three doses of vaccines against diphtheria (D_3), pertussis (P_3), tetanus (T_3), *Haemophilus influenzae* type b (Hib_3), polio ($Polio_3$) and meningococcal ($MenC_3$) at two, four and six months of age. Between 12 and 15 months of age children should receive the first dose of MMR (MMR_1) and since September 2006, a booster dose of Hib is routinely offered at the same time as MMR_1. A booster dose of DTaP/Polio is scheduled for children at four to five years of age, as is a second dose of MMR vaccine. A booster dose of tetanus and diphtheria should be given to children at 11 to 14 years of age. To effectively control vaccine preventable diseases it is recommended that at least 95% of children complete the childhood immunisation schedule.

In this report immunisation uptake statistics for 2006 are presented. These statistics relate to children who completed the recommended childhood immunisation schedule by 12 months (born between 01/01/2005 and 31/12/2005) or 24 months of age (born between 01/01/2004 and 31/12/2004) in 2006.

Immunisation uptake rates at 12 months

National immunisation uptake rates for D_3, P_3, T_3, Hib_3 and $Polio_3$ in children 12 months of age in 2006 were 86%. This was an improvement of one percent compared to 2005. $MenC_3$ uptake in 2006 was 85%, unchanged from 2005. Uptake of the above vaccines ranged from 82% in the HSE Eastern Area to 91-92% in the HSE Midland and North Western Areas (table 1).

Table 1. Annual immunisation uptake rates by HSE area for children 12 and 24 months of age in 2006

HSE area	% Uptake at 12 months Cohort born 01/01/2005 - 31/12/2005						% Uptake at 24 months Cohort born 01/01/2004 - 31/12/2004					
	D_3	P_3	Hib_3	$Polio_3$	$MenC_3$	BCG	D_3	P_3	Hib_3	$Polio_3$	$MenC_3$	MMR_1
HSE E	82	82	82	82	82	na	88	88	88	88	88	82‡
HSE M	92	92	92	92	92	94	97	97	96	97	97	94
HSE MW	89	89	89	89	89	93	91	91	91	91	91	88
HSE NE	89	89	89	89	86	na	93	93	93	93	92	89
HSE NW	92	92	91	92	91	92	95	95	95	95	93	91
HSE SE	86	86	86	86	86	94	91	91	91	91	90	87
HSE S	87	87	87	87	86	88*	93	93	93	93	93	88
HSE W	88	88	88	88	87	na	93	92	93	93	90	86
Ireland	**86**	**86**	**86**	**86**	**85**	**93†**	**91**	**91**	**91**	**91**	**90**	**86‡**

Since T_3 uptake identical to D_3 uptake only D_3 uptake figures presented
**HSE S part coverage of neonatal BCG (i.e. Kerry only)*
†Based on data from five of the eight HSE areas
‡This figure includes the Quarter 1 2006 HSE E figure, which is an estimate only due to technical problems with extraction of MMR_1 data from the HSE E database

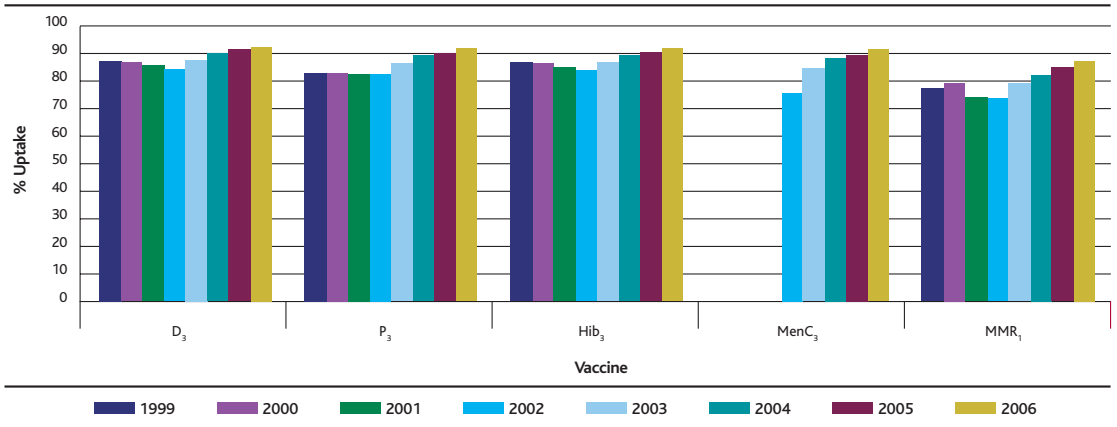

Figure 1. National annual immunisation uptake rates at 24 months
Since T_3 uptake identical to D_3 uptake only D_3 uptake figures presented and since $Polio_3$ uptake almost identical to Hib_3 uptake only Hib_3 figures presented
The 2006 MMR_1 figure includes the Quarter 1 2006 HSE E figure, which is an estimate only due to technical problems with extraction of MMR_1 data from the HSE E database
The 2005 MMR_1 uptake figure is incomplete as HSE E was unable to provide MMR data for Quarter 4 2005 due to technical problems

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Antimicrobial Resistance in Ireland, 2006

Introduction

The European Antimicrobial Resistance Surveillance System (EARSS) in Ireland collects routinely-generated antimicrobial susceptibility testing data on seven important bacterial pathogens using the EARSS case definition: data are submitted on the 'primary' or first isolate from blood and/or CSF per patient per quarter. As of January 2006, EARSS in Ireland expanded to include two additional pathogens, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. In 2006, 42 of 43 laboratories in Ireland participated in EARSS representing coverage of 98% of the Irish population.

Staphylococcus aureus

There were 1,399 reports of *S. aureus* bacteraemia in 2006, of which 588 (42.0%) were meticillin-resistant *S. aureus* (MRSA). The proportion of MRSA in Ireland has been approximately 42% for the past four years (figure 1). Ireland still has one of the highest proportions of MRSA in Europe (http://www.rivm.nl/earss/database/ for European data).

Two MRSA isolates with reduced susceptibility to vancomycin were detected at the National MRSA Reference Laboratory by the Etest macromethod with values of 12mg/L. Both isolates also had vancomycin minimum inhibitory concentrations (MICs) of 4mg/L, by which they were classified as vancomycin-intermediate *S. aureus* (VISA) according to the latest CLSI guidelines. Both were confirmed as VISA by the Centers for Disease Control (CDC), Atlanta. These are the first reports of VISA in Ireland.

The MRSA rate in acute public hospitals only was 0.15 per 1,000 patient bed days used (calculated using acute public hospital activity data from the National Hospitals Office at the Health Service Executive). The MRSA rate has been steady at 0.15 per 1,000 patient days for the past three years.

Streptococcus pneumoniae

There were 407 reports of invasive *S. pneumoniae* infection (403 from blood and 4 from CSF), of which 64 (15.7%) were penicillin-non-susceptible *S. pneumoniae* (PNSP). The proportion of PNSP in Ireland has increased significantly over the past three years from 10.3% in 2004 to 15.7% in 2006 (Chi^2_{trend}=5.5, P=0.019) (figure 2). Sixty three (16.1%) of 392 isolates were resistant to erythromycin, which was an increase from 12.1% in 2005. In 2006, the highest proportions of PNSP were seen in Southern and the lowest in Northern Europe, with moderately high levels in Ireland. Erythromycin resistance was at moderately high levels in most countries, including Ireland.

Of the 64 PNSP isolates, 48 were intermediately resistant (Int; MIC=0.1-1.0mg/L) and 12 were high-level resistant (HLR; MIC >1.0mg/L) to penicillin. No penicillin MICs were available for four non-susceptible (NS) isolates. Of isolates tested against both penicillin and erythromycin (n=393), 29 (7.4%) were simultaneously PNSP (20 Int, 6 HLR, 3 NS) and erythromycin-resistant.

Serotype data were available on 60 pneumococcal isolates from five laboratories only. Overall, 59 (98%) and 33 (55%) of 60 isolates belonged to serotypes covered by the pneumococcal polysaccharide (PPV-23; target population: adults 65 years and at-risk groups) and conjugate (PCV-7; target population: children <2 years) vaccines, respectively. From adults ≥65 years of age, 20 of 21 (95%) isolates would be covered by PPV-23, while from children <2 years, 11 of 14 (79%) isolates would be covered by PCV-7. Of the 10 PNSP isolates for which serotype data were available, five belonged to serotype 9V (4 Int, 1 HLR), four to serotype 6B (all Int) and one to serotype 14 (Int), all of which would be covered by both PPV-23 and PCV-7. Five of these were from adults >65 years old while three were from children <2 years old.

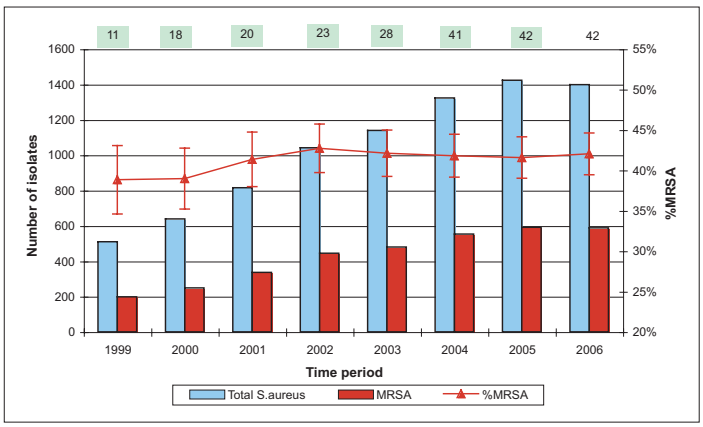

Figure 1. Trends for S. aureus - total numbers of S. aureus/MRSA and percentage MRSA with 95% confidence intervals
The numbers of participating laboratories by year-end are indicated above the bars

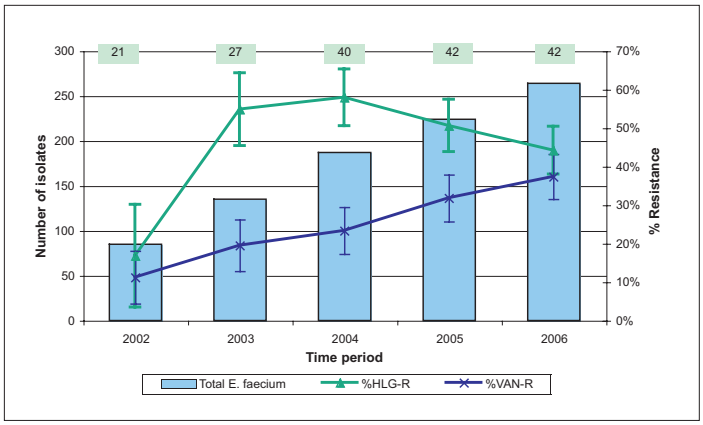

Figure 3. Trends for E. faecium - total numbers of E. faecium and percentage resistance to high-level gentamicin (HLG) and vancomycin (VAN) with 95% confidence intervals
The numbers of participating laboratories by year-end are indicated above the bars

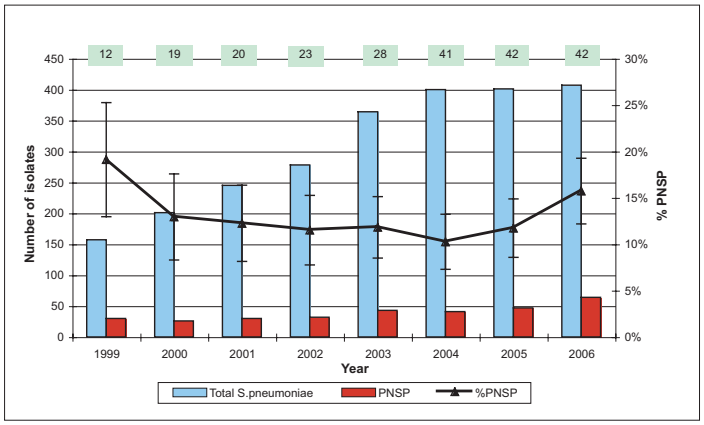

Figure 2. Trends for S. pneumoniae - total numbers of S. pneumoniae/PNSP and percentage PNSP with 95% confidence intervals
The numbers of participating laboratories by year-end are indicated above the bars

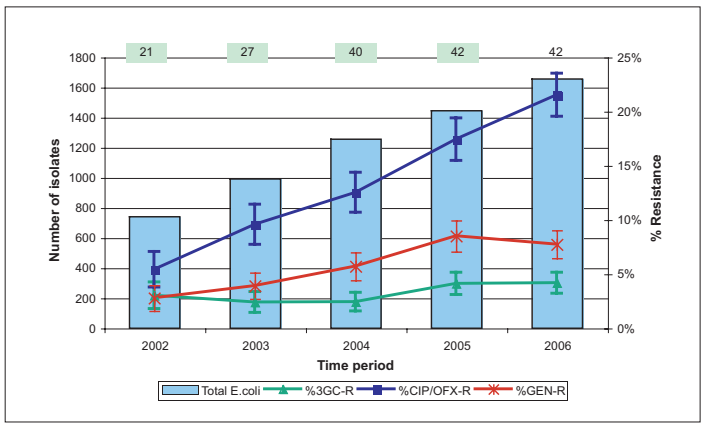

Figure 4. Trends for E. coli - total numbers of E. coli and percentage resistance to 3GCs, ciprofloxacin/ofloxacin (CIP/OFX) and gentamicin (GEN) with 95% confidence intervals
The numbers of participating laboratories by year-end are indicated above the bars

The rate of invasive pneumococcal disease (IPD) in Ireland in 2006 was estimated to be 9.8 per 100,000 population compared with 9.7 in 2005 (both calculated using the 2006 census data). The highest rates of IPD were observed in children <1 year (49.1 per 100,000) and adults aged 75-79 years (40) and adults >80 years (70).

Enterococcus faecalis

There were 294 reports of *E. faecalis* bacteraemia, of which 3.7% were vancomycin-resistant *E. faecalis* (VREfa). Although this proportion was low, Ireland still has one of the highest proportions of VREfa in Europe.

Thirteen isolates were ampicillin-resistant, which suggests that these isolates were either misidentified as *E. faecalis* or misclassified as ampicillin-resistant as resistance to ampicillin is rare in *E. faecalis*.

Enterococcus faecium

There were 265 reports of *E. faecium* bacteraemia, of which 37.1% were vancomycin-resistant *E. faecium* (VREfm). The proportion of isolates that were VREfm has increased significantly (Chi^2_{trend}=30.00; P<0.001) over the five years for which surveillance has been undertaken (figure 3). On average, the proportion of VREfm isolates increased by 6.4% for each successive year. Ireland has one of the highest proportions of VREfm in Europe.

Of 246 isolates tested against all three indicator antibiotics (ampicillin, high-level gentamicin and vancomycin), 63 (25.6%) were resistant to all three and therefore classed as MDR. The proportion of isolates that are MDR has increased significantly (Chi^2_{trend}=19.15, P<0.0001) from 3.6% in 2002. On average, the proportion of MDR *E. faecium* isolates increased by 6% for each successive year. However, no increase was observed between 2005 and 2006.

Escherichia coli

There were 1,656 reports of invasive *E. coli* infection (1,649 from blood and 7 from CSF), of which 21.5% were resistant to ciprofloxacin, a fluoroquinolone. The proportion of isolates that are ciprofloxacin-resistant has increased significantly (Chi^2_{trend}=142.652, P<0.0001) from 5.4% when surveillance began in 2002. On average, the proportion of ciprofloxacin-resistant *E. coli* isolates increased by 4% for each successive year. The proportions of *E. coli* isolates resistant to the other indicator antibiotics/antibiotic classes were: ampicillin, 70.7%; third-generation cephalosporins (3GCs; e.g. cefotaxime or ceftazidime), 4.2%; and aminoglycosides (gentamicin or tobramycin), 7.7%. In 2006, fluoroquinolone-resistance was at moderately high levels in Ireland compared to other European countries, while resistance to 3GCs and aminoglycosides was low and moderately low, respectively.

Of 1,246 isolates tested, extended spectrum beta-lactamases (ESBLs) were detected in 35 (2.8%) of isolates. ESBLs are enzymes that confer resistance to most penicillins and cephalosporins (including 3GCs). ESBL-producing bacteria (including *K. pneumoniae* and, increasingly, *E. coli*) are often resistant to other classes of antibiotics and have emerged as important causes of infections in hospitals. No significant increase in ESBL-producing *E. coli* has been observed from invasive infections to date in Ireland.

Of 1,622 isolates tested against all four indicator antibiotics/classes, 146 (9.0%) were identified as MDR: 15 with resistance to all four; 96 with resistance to ampicillin, ciprofloxacin and gentamicin; 34 with resistance to ampicillin, 3GCs and ciprofloxacin; and one with resistance to ampicillin, 3GCs and gentamicin. The proportion of isolates that are MDR has increased significantly (Chi^2_{trend}=55.142, P<0.0001) from 2.4% when surveillance began in 2002. On average, the proportion of MDR *E. coli* isolates increased by 1.7% for each successive year.

Klebsiella pneumoniae

There were 128 reports of invasive *K. pneumoniae* infection (all from blood) (with 36 of 43 laboratories participating in this surveillance activity). The proportions of *K. pneumoniae* isolates resistant to the four indicator antibiotics/antibiotic classes were: ampicillin, 97.7%; 3GCs, 9.7%; fluoroquinolones, 16.3%; and aminoglycosides, 17.8%. Of 126 isolates tested, ESBLs were detected in 11 (8.7%) of isolates. It is too early to comment on trends as data have only been collected for one year.

Five isolates were ampicillin-susceptible, which represent isolates either misidentified as *K. pneumoniae* or misclassified as ampicillin-susceptible as all klebsiellae are inherently resistant to this antibiotic.

Twenty-three (11.6%) of 198 isolates tested against all four indicator antibiotics/classes were identified as MDR: three with resistance to all four; nine with resistance to ampicillin, 3GCs and ciprofloxacin; and 11 with resistance to ampicillin, ciprofloxacin and gentamicin.

Pseudomonas aeruginosa

There were 128 reports of invasive *P. aeruginosa* infection (all from blood) (with 36 of 43 laboratories participating in this surveillance activity). The proportions of *P. aeruginosa* isolates resistant to the five indicator antibiotics/antibiotic classes were: piperacillin-tazobactam, 10.2%; ceftazidime, 10.6%; carbapenems (meropenem or imipenem), 11.8%; fluoroquinolones (ciprofloxacin or ofloxacin), 18.1%; and gentamicin, 10.2%. It is too early to comment on trends as data have only been collected for one year.

Eleven (9.5%) of 116 isolates tested against all five indicator antibiotics/classes were MDR: four with resistance to piperacillin-tazobactam, ceftazidime, ciprofloxacin and gentamicin; three with resistance to meropenem, ciprofloxacin and gentamicin; and one each with resistance to piperacillin-tazobactam, ceftazidime and meropenem; ceftazidime, meropenem and ciprofloxacin; ceftazidime, ciprofloxacin and gentamicin; and piperacillin-tazobactam, ciprofloxacin and gentamicin.

Conclusion

Antimicrobial resistance (AMR) continues to be a major public health challenge in Ireland. Significant increases in the proportions of PNSP (now at 15.7%), VREfm (37.1%) and ciprofloxacin-resistance in *E. coli* (21.5%) have been observed over the past three to four years, while the proportion of MRSA has remained stable, albeit high, at approximately 42% for the past four years. MDR is also a growing problem with *E. coli* and *E. faecium*, accounting for 9.0% and 25.6% of isolates, respectively, in 2006, and significant increases year-on-year since surveillance began in 2002. In 2006, the first two isolates of VISA were reported. AMR surveillance in two other key pathogens, *K. pneumoniae* and *P. aeruginosa*, commenced in 2006 and indicates that resistance levels to most of the commonly used antibiotics is already at 8-12% and even higher for ciprofloxacin at 16.3% and 18.1%, respectively. In addition, MDR already accounts for 11.6% and 9.5% of isolates, respectively, for these pathogens. The data presented here serve to highlight the urgent need for full implementation of the recommendations included in the 2001 Strategy for the control of Antimicrobial Resistance in Ireland (SARI). Healthcare-associated infection (HCAI) and AMR have been identified as priority issues for the HSE and it is hoped that the recent establishment of the HSE HCAI Governance Committee will result in the necessary interventions needed to reverse the trends summarised in this report.

S Murchan, R Cunney on behalf of the EARSS Steering Group and the Irish EARSS participants

Immunisation Uptake in Ireland, 2006 (continued)

BCG uptake data were available from five of the eight HSE areas,[2] which represent approximately one-third of the national birth cohort. Where data were available, national BCG uptake was 93% in 2006, unchanged compared to 2005.

Immunisation uptake rates at 24 months

National uptake rates in children 24 months of age in 2006 for D_3, P_3, T_3, Hib_3 and $Polio_3$ were 91% and 90% for $MenC_3$ (table 1). Compared with 2005, uptake of these vaccines increased by one percent (figure 1). Uptake of D_3, P_3, T_3, Hib_3, $Polio_3$ and $MenC_3$ ranged from 88% in the HSE Eastern Area to 96-97% in the HSE Midland Area (table 1). Seven of the eight HSE areas had 90% or greater uptake for all these vaccines. The target uptake of 95% was reached for D_3, P_3, T_3, Hib_3, $Polio_3$ and $MenC_3$ in the HSE Midland Area and for D_3, P_3, T_3, Hib_3 and $Polio_3$ in the HSE North Western Area during 2006.

During 2006, MMR_1 uptake was 86% nationally (this figure includes the Quarter 1 2006 HSE Eastern Area figure which is an estimate only due to technical problems with extraction of MMR_1 data from the HSE Eastern Area database). During Quarter 1 2006, MMR_1 uptake was 95% in the HSE Midland Area.

Discussion

While the target uptake of 95% was achieved during 2006 in the HSE Midland Area for D_3, P_3, T_3, Hib_3, $Polio_3$ and $MenC_3$ and in the HSE North Western Area for D_3, P_3, T_3, Hib_3 and $Polio_3$ the national uptake rates at 24 months for these vaccines were four to five percent below the target rate. In Quarter 1 2006, the target uptake rate of 95% was reached for MMR_1 in the HSE Midland Area similar to Quarter 4 2005. These are the only times any HSE area has reached the target uptake of 95% for MMR_1 since the collation of these statistics commenced in 1999. However, the national annual uptake of MMR_1 in 2006 was nine percent below the target rate. Improvements in uptake are necessary in order to reach the 95% target rate nationally for all vaccines and to prevent outbreaks of these vaccine preventable diseases in the future.

Sarah Gee and Suzanne Cotter, HPSC

Acknowledgements

HPSC would like to thank the HSE areas for providing these data. In particular, thanks to the specialists in public health medicine, surveillance scientists, immunisation co-ordinators and systems analysts for their help.

Notes

1. BCG vaccine is routinely administered within the neonatal period in six of the eight HSE areas. In the HSE Southern (Cork only) and Western Areas BCG is administered to older children and at risk groups.
2. BCG uptake data at 12 months are not available in the HSE Southern (Cork) and Western Areas for the reason outlined above. In the HSE Eastern and North Eastern Areas BCG vaccination uptake data are not readily available for national reporting purposes.

Local Health Office Immunisation Uptake Rates

The Local Health Office (LHO) immunisation uptake rates for Quarter 1 2007 are now available on the HPSC website at http://www.ndsc.ie/hpsc/A-Z/VaccinePreventable/Vaccination/ImmunisationUptakeStatistics/2007/Quarter12007/. This was the first quarter that the immunisation uptake rates were published and mapped by LHO. Figure 1 is an example of the data available and shows uptake of the first dose of the measles-mumps-rubella vaccine (MMR_1) in children 24 months of age in Quarter 1 2007. Highlighted in green are the three LHOs that in Quarter 1 2007 reached the national and WHO target uptake rate of 95% required to prevent transmission and outbreaks of these diseases. The target uptake rate of 95% was not reached in the remaining LHOs.

This was also the first quarter that uptake rates for the *Haemophilus influenzae* type b (Hib) booster vaccine, in those 24 months of age, were available. Hib uptake data were available for seven of the eight HSE areas covering approximately 91% of the birth cohort in Quarter 1 2007. Where data were available, national uptake was 76%. Hib uptake rates by HSE area and by LHO are also available on the HPSC website at the hyperlink above.

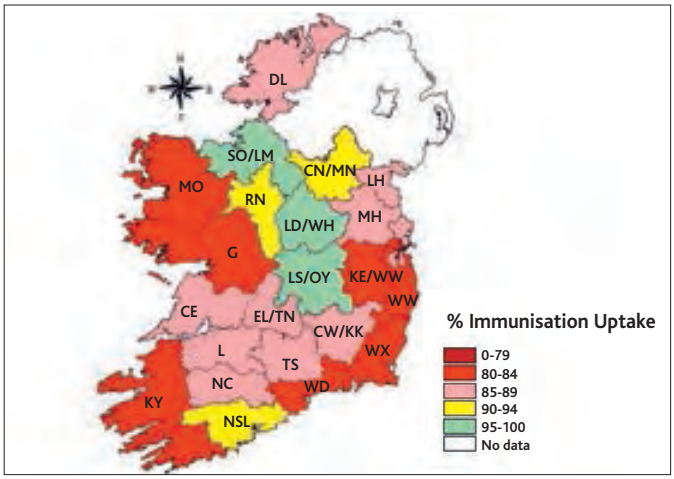

Figure 1. MMR_1 immunisation uptake rates (%) by LHO for children 24 months of age in Quarter 1 2007. Please see the Summary Q1 2007 Immunisation Uptake Statistics by LHO report at http://www.ndsc.ie/hpsc/A-Z/VaccinePreventable/Vaccination/ImmunisationUptakeStatistics/2007/Quarter12007/ to translate codes for LHO areas. Please note while North Lee and South Lee are two separate LHOs their combined immunisation uptake data are reported here (NSL).

Measles Outbreak in Dublin School.

Since the beginning of September 2007, there have been nine cases of measles associated with a Dublin school. The school initially alerted the Department of Public Health to possible measles cases. The cases occurred in pupils aged 4-17 years and all were unimmunised. Laboratory confirmation was obtained for four cases. The parents of these children, and of subsequent cases, were contacted and enhanced measles surveillance information acquired. Arrangements were made to collect salivary swabs for laboratory confirmation on all suspected cases. Letters were sent to parents informing them of the outbreak and advising them to ensure their children had two doses of MMR in order to provide full protection against measles. An outbreak control team was convened. A&E consultants, GPs and GP deputising services in Dublin and Wicklow were alerted to the outbreak. Nationally, the Directors of Public Health were also alerted. Arrangements were made with the relevant community care area to expedite the routine MMR immunisation of children currently in junior infant classes at the school. Four of the measles cases occurred in the class which in 2006/7 had a lower uptake of the second dose of MMR (79%) than the average for the rest of the primary school (89%). Active surveillance and management is continuing.

Helena Murray, Jackie McElhinney, Freda O'Neill on behalf of the Outbreak Control Team