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hpsc
Health Protection Surveillance Centre
25-27 Middle Gardiner St
Dublin 1, Ireland
Ph +353 1 876 5300
Fx +353 1 856 1299
E info@mailx.hse.ie
www.hpsc.ie

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Meticillin-Resistant *Staphylococcus Aureus* in Animals in Ireland

[a]*Note: The spelling of 'meticillin' has been used in place of 'methicillin' in accordance with new International Pharmacopoeia guidelines.*

Meticillin-resistant[a] *Staphylococcus aureus* (MRSA) is predominantly a nosocomial problem but community acquisition is being reported with increasing frequency.[1,2] Reports of MRSA in animals suggest that such isolates may be of human origin and may be a source of infection for human patients.[3-6] A recent study from the UK showed that the majority of 95 isolates from domestic pets belonged to one or other of the two major epidemic MRSA (EMRSA) strains (EMRSA-15 and EMRSA-16) currently prevalent in UK hospitals.[5] The present communication reports the isolation of two different strains of MRSA from two animal groups in Ireland. The first strain was isolated from 17 non-equine animals and was indistinguishable from the predominant strain prevalent in Irish hospitals in 2003.[7,8] The second strain was recovered from eight horses attending a veterinary hospital and was unlike any strain prevalent in human hospitals in Ireland.[7,8]

Between May 2003 and October 2004, 44 MRSA isolates recovered from animals and attendant veterinary personnel from one veterinary hospital and 16 different veterinary practices were submitted for epidemiological investigation to the National MRSA Reference Laboratory (NMRSARL). On receipt, isolates were confirmed as MRSA and characterised by antibiogram-resistogram (AR) typing, biotyping and by DNA macrorestriction analysis of chromosomal DNA followed by pulsed field gel electrophoresis (PFGE) as described previously.[9-11] Typing patterns were compared with patterns held in the NMRSARL's database which includes data on blood culture MRSA isolates recovered in Irish hospitals that participate in the European Antimicrobial Resistance Surveillance System (EARSS). Between 1999 and 2003, 1,580 blood culture isolates received from 1,495 patients in Irish hospitals that participate in EARSS have been typed by AR typing and by PFGE analysis.[11]

The MRSA isolates investigated in the present study were recovered from specimens from 25 animals and 10 attendant veterinary personnel. The animals comprised 14 dogs, eight horses, one cat, one rabbit and one seal from 16 different veterinary practices in nine counties countrywide.[8] Epidemiological typing showed that the isolates from non-equine animals were unlike the isolates obtained from the horses. The majority of the former (11/17; 64%) exhibited a relatively susceptible AR pattern being resistant only to one or more of the following antimicrobials: cadmium, erythromycin, lincomycin, tetracycline and/or ciprofloxacin. Isolates exhibiting resistance to tetracycline and/or lincomycin were not assigned to an AR type but were designated 'no type' ('NT') pending PFGE analysis because previous experience in the NMRSARL with isolates exhibiting similar AR patterns showed that such isolates required PFGE for correct classification.[10, 11] The remaining six isolates exhibited an AR type, designated AR06. All 17 isolates were urease-negative. With three exceptions, a single PFGE pattern (designated PFT 01018) was obtained from all 17 isolates. Isolates from six attendant veterinary personnel were indistinguishable from isolates from animals in their

Newly Diagnosed HIV Infections in Ireland, 2004

Introduction

Worldwide, HIV kills more than 8,000 people every day. Nearly 5 million people are newly infected with the HIV virus every year and the vast majority of these people live in developing countries.

HIV and AIDS surveillance in Ireland is voluntary and anonymous, and operates in cooperation with laboratories, clinicians and Departments of Public Health. AIDS surveillance was introduced in Ireland in the mid 1980s and HIV case based reporting was introduced in 2001. The aims of HIV case based reporting are to ensure the collection of timely data on the distribution and mode of transmission of HIV infection, to accurately monitor trends in the epidemic and to enable linkage between reports of HIV infection and AIDS.

HIV Infections

Between 1998 and 2003, there was a dramatic increase in the number of newly diagnosed HIV infections from 116 cases in 1998 to 399 cases in 2003 (a 3.4 fold increase). During 2004, a total of 356 HIV infections were newly diagnosed. This compares to 399 diagnosed in 2003 and represents a 10.8% decrease. The cumulative total number of HIV infections reported up to the end of December 2004 was 3,764. Figure 1 shows the number of cases diagnosed annually in Ireland from 1990 to 2004.

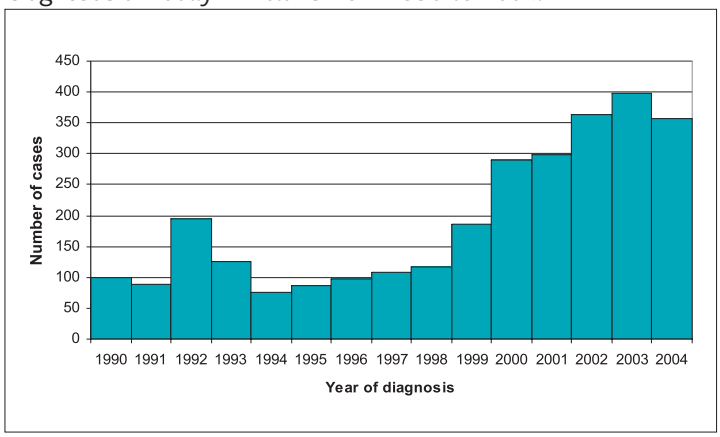

Figure 1. Annual number of HIV infections, 1990 to 2004

Probable route of transmission

Figure 2 shows the trends in newly diagnosed cases among the three major risk groups, heterosexual contact, men who have sex with men (MSM) and injecting drug users (IDUs) since 1994.

Between 1998 and 2002, there was a steep increase in the number of newly diagnosed cases acquired through heterosexual contact from 47 in 1998 to 232 in 2002. Between 2002 and 2004, the number of cases acquired through heterosexual contact decreased but still remains the most common route of transmission. Information on probable route of transmission was unavailable for 11% of the cases diagnosed in 2004.

There were 62 new HIV infections diagnosed among MSM during 2004. This compares with 75 during 2003 and 46 in 2002.

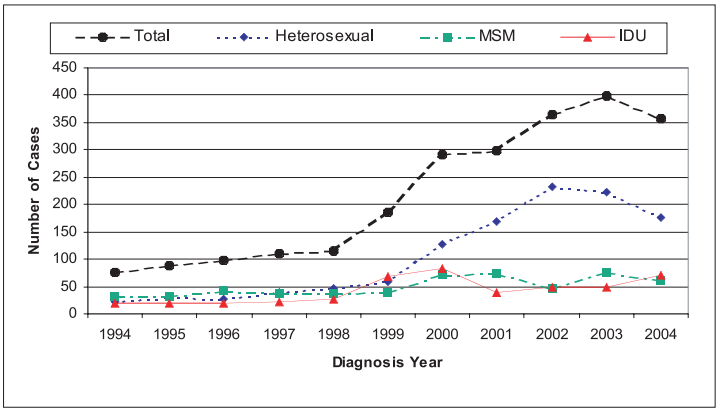

Figure 2. Newly diagnosed HIV infections in Ireland among heterosexuals, MSM and IDUs, 1994 to 2004

Among IDUs, there were 71 HIV infections newly diagnosed during 2004 compared to 49 in 2003 and 50 in 2002.

HIV infection was newly diagnosed in five children during 2004. Of the five, three were infected through mother-to-child transmission (MCT). During 2004, there were 113 babies born to HIV positive mothers. Of the 113 babies, one was diagnosed with HIV infection and the status of the remaining 112 was indeterminate (they did not meet the criteria for HIV infection and were <18 months at time of test).

Age distribution and sex

Of the 356 cases newly diagnosed in 2004, 192 (53.9%) were male and 161 (45.2%) were female. Information on gender was unavailable for 3 cases. Among females, the most frequent route of transmission was heterosexual contact which accounted for 72% of newly diagnosed infections among females. Among males, the most frequent routes of transmission were heterosexual contact and sex between men with each accounting for 32% of new infections among males.

Of the 161 females who were diagnosed with HIV infection in 2004, 46 were reported to be pregnant at HIV diagnosis. Information relating to pregnancy status was unavailable for 30 of the female cases.

Most of the newly diagnosed cases (78.1%) were aged between 20 and 40 years. The mean age at HIV diagnosis was 31.5 years. The mean age at HIV diagnosis was 30.1 years in IDUs, 31.3 years in heterosexuals and 35.5 years in MSM. The mean age at HIV diagnosis was 28.8 years in females and 33.7 years in males, a difference of 4.9 years.

Geographic origin

Analysis of 2004 cases by geographic origin is presented in figure 3. Classification by geographic origin is as used by EuroHIV. Geographic origin is based on country of birth for adult cases and country of birth of the mother for children.

Of the 356 cases diagnosed in 2004, 136 were born in Ireland, 130

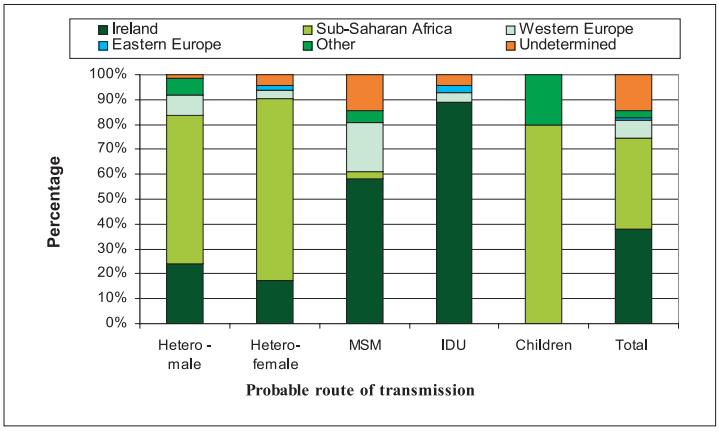

Figure 3. Newly diagnosed HIV infections in Ireland by probable route of transmission and geographic origin (2004)

were born in Sub-Saharan Africa and 25 were born in other countries in Western Europe. Information on geographic origin was unavailable for 51 of the newly diagnosed cases.

Of the 178 cases acquired through heterosexual contact, 122 were born in Sub-Saharan Africa (85 female and 37 male) and 35 were born in Ireland (20 female and 15 male).

Stage of infection

Information on stage of infection at time of HIV diagnosis was available for 298 of the newly diagnosed cases. Of the 298 cases, 225 were asymptomatic at HIV diagnosis and 41 were diagnosed with AIDS at the time of HIV diagnosis.

AIDS Cases and Deaths among HIV/AIDS Cases

A total of 838 AIDS cases and 390 deaths among HIV/AIDS cases have been reported to the Health Protection Surveillance Centre up to the end of March 2005. Detailed reports on AIDS cases and related deaths can be found on the HPSC website (www.hpsc.ie).

Discussion

This article describes the epidemiology of HIV infections newly diagnosed in 2004. While there has been a decrease in the overall number of HIV infections diagnosed in 2004, the data should be interpreted with caution, as the downward trend may not continue in future years. It is also important to note that data for reported HIV diagnoses do not represent HIV incidence. These data include individuals who were infected in previous years, and the figures depend on uptake of HIV testing. In addition, incomplete data were received for 14% of the newly diagnosed cases, which makes analysis of the data and interpretation of trends difficult.

The number of new diagnoses among IDUs increased in 2004 and highlights the need for maintaining harm reduction measures in order to prevent transmission of blood borne viruses among needle sharing drug users. The number of newly diagnosed infections reported among MSM, while showing a slight downward trend on the 2003 data, is an increase on the numbers reported in 2002. This is of concern in the context of the continuing endemicity of syphilis in Ireland following the syphilis outbreak among MSM which began in Dublin in 2000.[1] Syphilis and other genital ulcer diseases facilitate the transmission and acquisition of HIV.[2]

It has been clearly shown that vertical transmission of HIV from mother to child can be dramatically reduced or prevented by appropriate intervention and treatment measures. However, such measures can only be offered if HIV infection is diagnosed before or during pregnancy. A policy to recommend and offer routine antenatal HIV testing to all women was introduced in Ireland in 1999. Further information on antenatal HIV screening is available on the HPSC website (www.hpsc.ie). During 2004, a total of 113 babies were born to HIV infected mothers and of these, only one was diagnosed with HIV infection. The status of the remaining 112 was indeterminate (they do not meet the criteria for HIV infection and were <18 months at time of test). This illustrates the effectiveness of the antenatal screening programme in Ireland.

Of the 178 cases acquired through heterosexual contact for which data are available, the majority (122) were born in Sub-Saharan Africa and 35 were born in Ireland. It is estimated that there are 40 million people living with HIV/AIDS worldwide and Sub-Saharan Africa is the area of the world most severely affected by the epidemic. Therefore, the number of cases of HIV infection in Ireland diagnosed among people of Sub-Saharan African origin is not unexpected, considering the prevalence of HIV in that region. There is a need for culturally appropriate prevention messages to be developed in partnership with ethnic minority communities.

Of the 356 cases newly diagnosed with HIV in 2004, 41 were late diagnoses, i.e. they were diagnosed with AIDS at the time of HIV diagnosis. These individuals would not have had the opportunity to benefit from early diagnosis and treatment prior to AIDS diagnosis. These data highlight the importance of routine HIV testing in all the appropriate settings, as diagnosis at an early stage in the course of HIV infection facilitates early intervention and treatment.

Kate O'Donnell and Mary Cronin, HPSC

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respective practices.[8] Approximately 80% of MRSA from human patients investigated by the NMRSARL during 2003 exhibited AR type AR06 (or variants of this AR type such as the 'NT' patterns) and 40% of these yielded PFT 01018.

The eight isolates from horses exhibited AR patterns that were unlike any patterns in NMRSARL's AR typing patterns database. These isolates were resistant to the aminoglycosides gentamicin, kanamycin and tobramycin and were variably resistant to neomycin. They were also resistant to erythromycin, tetracycline, sulphonamide and trimethoprim and were variably resistant to ciprofloxacin, lincomycin and rifampicin. All were urease-positive. A single PFGE pattern (designated PFT 00173) was obtained from seven of the eight isolates from horses. All equine isolates were obtained from cases referred to a specialist veterinary hospital and the typing data suggested that cross-infection might have occurred in that hospital and in one referring practice.[8]

MRSA from the non-equine animals resembled isolates of the predominant strain found in human patients in Ireland. This strain, which is similar to UK EMRSA-15, exhibits a limited number of AR and PFGE patterns making interpretation of epidemiological typing results difficult and poses a problem when trying to assess whether apparent clusters of this strain are occurring as a result of cross-infection or because of independent acquisition.[11] An investigation of the animals' owners for MRSA carriage and healthcare-associated (HCA) risk factors for acquisition of MRSA might reveal a possible nosocomial source for these isolates. Similarly, veterinary personnel themselves may have human HCA risk factors for the acquisition of MRSA. The equine isolates are unlike MRSA seen in human medical practice in Ireland. MRSA from horses were first noted in Canada in 2000 where it was reported that the infecting strain (designated CMRA-5) originated from but was relatively uncommon in humans.[6]

A study to establish the prevalence of MRSA in domestic animals in Ireland is urgently required together with guidelines for the control of MRSA in veterinary medicine. A major problem presented by the emergence of MRSA in animals in Ireland is the fact that the human-associated strain reported in the present study is notoriously difficult to control and eradicate if it becomes established in institutions such as hospitals or nursing homes.[1] Aggressive infection control measures may be required to prevent it becoming established in veterinary medical practice in Ireland. If domestic animals become a reservoir for MRSA, infection control guidelines for human patients would need to be revised to take cognisance of this development.

AS Rossney,[1] FC Leonard,[2] B O'Connell[1]

[1]National MRSA Reference Laboratory, St James's Hospital, James's St, Dublin 8, Ireland.

[2]Faculty of Veterinary Medicine, University College Dublin, Belfield, Dublin 4, Ireland.

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