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Focus on *Clostridium difficile*

C. difficile is the major cause of diarrhoea following antibiotic therapy. Most infections occur in hospitals (including community hospitals) and nursing homes but it can also occur in the community. Most of those affected are elderly patients with underlying illnesses. While *C. difficile* colonises the large intestine, not all patients who are colonised will develop diarrhoea.

It can be found in low numbers in a small proportion (less than 5%) of the healthy adult population. It is common in the intestine of babies and infants, but does not cause disease because its toxins do not damage their immature intestinal cells.

Transmission

Although some people can be healthy carriers of *C. difficile*, in most cases the disease develops after cross infection (spread) from another patient, either through direct patient to patient contact, via healthcare staff, or via a contaminated environment. A patient who has *C. difficile* diarrhoea excretes large numbers of the spores in their liquid faeces, which can contaminate the general environment around the patient's bed, the toilet areas, sluices, commodes, bed pan washers, etc. Spores can survive for a long time and be a source of hand-to-mouth infection for others, especially if they have also been given antibiotics.

Laboratory Diagnosis

Worldwide, over 100 types of *C. difficile* have been identified. *C. difficile* infection is diagnosed in most microbiology laboratories by demonstration of *C. difficile* toxin in the stool of suspected patients. Toxin is usually detected by an immuno-enzymatic assay. This assay does not type the *C. difficile* isolate.

***C. difficile* 027**

Recently a new strain of *C. difficile* has been described. *C. difficile* Type 027 was first identified in the UK in 1999. When outbreaks at two UK centre were investigated in 2004-05, Type 027 was found to predominate in their cases. The same type has caused a large outbreak of severe disease in hospitals in Canada (Quebec) and North-Eastern USA since 2000. Cases of 027 have been described in other European countries, including Ireland.

Type 027 appears to be a more virulent strain as it produces much more of the toxins than most other types due to a deletion in the gene that normally restricts toxin production. It causes a greater proportion of severe disease and appears to have a higher mortality. It also seems to be very capable of spreading easily between patients. This strain has increased antimicrobial resistance to fluorquinolones and administration of these antibiotics has emerged as an important risk factor for *C. difficile*-associated diarrhoea in a recent epidemic in Quebec.

Prevention and control

There are three important components to the prevention and control of *C. difficile* disease:

- **Prudent antibiotic prescribing** to reduce the use of broad spectrum antibiotics

- **Isolation of patients** with *C. difficile* diarrhoea, and good infection control practices
  - handwashing with soap and water (not relying solely on alcohol gel as this does not kill the spores)
  - wearing gloves and aprons, especially when dealing with bed pans etc.

- **Enhanced environmental cleaning** of patient care areas. The use of chlorine containing disinfectant, or other sporocidal disinfectant, is generally recommended.

The HPSC SAC is in the process of establishing a sub-committee to examine surveillance, laboratory diagnosis and management of *C. difficile* in Ireland.

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INTRODUCTION

Malaria is the most important vectorborne disease in the world, with 400 million infections and around 1 million deaths annually. It is endemic in over 100 countries in sub-tropical and tropical areas of Africa, Central and South America, Asia, the Middle East and Oceania, with 90% of deaths occurring in Sub-Saharan Africa, mostly among young children.

Infection is caused by transmission of one of 4 species of *Plasmodium* (*P. falciparum*, *P.ovale*, *P.vivax* or *P. malariae*) through the bite of infected female anopheline mosquitoes. The species vary in their clinical effects; *P. falciparum* causes the most severe form of malaria, and the most deaths. TropNetEurop reported a case fatality of 1.4% for *P. falciparum* infections imported into Europe[1]. Malaria caused by other *Plasmodium* species is less severe and rarely life threatening. *P.ovale* and *P.vivax* also differ in that they have persistent liver stages, which can resist conventional treatment and can produce relapses up to a year after the initial infection.

Worldwide each year, up to 30,000 travellers fall ill with malaria on their return from visiting countries where the disease is endemic [2]. Pregnant woman, young children and the elderly are particularly at risk. Malaria in pregnancy increases the risk of maternal death, miscarriage, stillbirth and neonatal death. As malaria is a relatively rare disease in Ireland, a high level of suspicion is necessary when travel to endemic areas has occurred in either the recent or distant past.

Increasing numbers of Irish residents are travelling to malarious regions for holiday and business travel. An increasing proportion of the population in Ireland originates from malaria endemic regions and regularly travels home.

Malaria surveillance aims to document the burden of illness in Ireland, to define the characteristics of those most at risk, and to identify those who could benefit most from preventive messages. In addition, the data collected permit monitoring for prophylaxis failures that might indicate emergence of drug resistance. There is potential also to identify cryptic cases: these are cases where the route of transmission is unclear or unusual.

MATERIALS AND METHODS

Malaria has been notifiable in Ireland since 1948. The case definition adopted since 2004 is based on the EU case definition[4]. Since 2001, public health physicians have provided enhanced surveillance data, e.g. country of infection, reason for travel and use of chemoprophylaxis, where available to HPSC. Notification and enhanced surveillance data are maintained in the CIDR (Computerised Infectious Disease Reporting) system. The data used in this report are based on information retrieved from the CIDR database (as of May 18th 2006) on malaria cases in 2005.

RESULTS

Malaria incidence in Ireland

In 2005, 44 cases of malaria were notified. (Figure 1). This is an increase of 62% on the number reported in 2004, and equates to a crude annual incidence rate of 1.1 per 100,000 (95% CI 0.79-1.45).

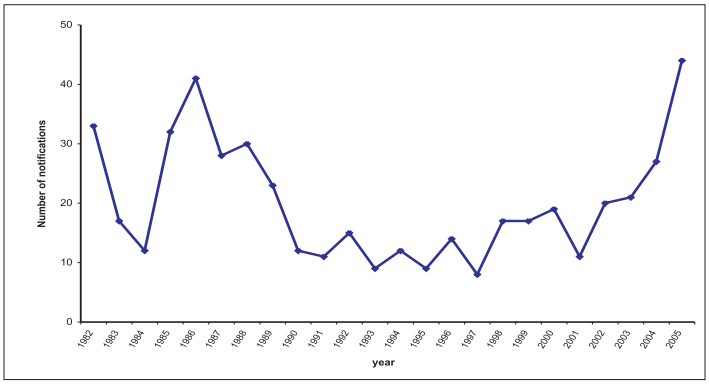

Figure 1. Number of malaria notifications, Ireland 1982-2005

Areas reporting the highest number of cases were the East (n=12), North-East (n=10) and South (n=10). There were also 5 cases in the HSE-M, 1 in the HSE-MW, 2 in the HSE-NW, 2 in the HSE-SE and 2 in the HSE-W.

Species of Plasmodium

As in previous years, the most common species reported was *P. falciparum*, accounting for 75% of all cases notified (n=33). There were also three *P. vivax*, one *P. ovale*, one *P. malariae* and one mixed *P. vivax P. ovale* infection. This is similar to the species distribution reported by the UK and in Europe for cases of imported malaria[5,6].

Age and sex distribution

Twenty-one cases were male and 21 were female (unknown/unspecified=2). Cases ranged in age from 1 to 64 years. Females in the 25-34 age group were the most common age-sex group reported, and there were ten notifications (23%) in children under the age of 15 (Fig 2).

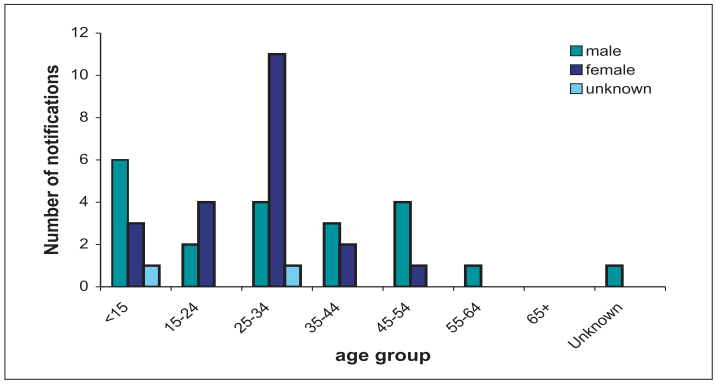

Figure 2. Age-sex distribution malaria cases, Ireland 2005

Clinical features

Twenty-one cases were hospitalised, one case was described as a GP patient, and for 22 cases this information was not specified. In 2005 one death in an adult was reported as being due *P. falciparum*.

Country of infection

In 2005, there were no cases of airport, congenital, induced or introduced malaria reported. One relapsed case of *P. vivax* was reported. The remaining 43 cases were either reported as being, or were assumed to be, imported. Country of infection was recorded for 33 cases, the majority of whom were exposed in sub-Saharan Africa, with the remainder exposed in Asia (Table 1).

Table 1. Malaria notifications, Ireland 2005 by country of exposure

Place of infection	Number of notifications	% of all cases
Sub-Saharan Africa	30	68%
Nigeria	22	50%
Other that Nigeria	8	18%
Asia	3	7%
Not reported	11	25%
Total	44	100%

Reason for travel

Reason for travel was recorded for 28 cases. The largest subgroup identified in 2005 was people who had travelled to visit family in their country of origin – over half of those for whom the information was available (n=15). New entrants made up a further quarter of cases (n=7), with the remainder reported as holidaymakers (n=1), business travellers (n=1), armed services (n=1), Irish citizen living abroad (n=1), other (n=2) and not specified (n=16).

Use of chemoprophylaxis

Excluding new entrants (those who had spent their lives to date living in an endemic region would not be expected to be taking chemoprophylaxis), information on malaria prophylaxis was available for 21 of the remaining 37 cases. Of these, 17 (81%) took no prophylaxis, 3 (14%) took prophylaxis but failed to continue for the required period. Only one case reported full compliance with prescribed course of prophylaxis.

Interval between arrival in Ireland and onset of symptoms

Malarial infections can occur up to several months following exposure. For 19 cases, data were available both for the date of arrival from malarious region and date of onset of illness. The interval between these dates varied between 0 and 181 days (median 7). Eighty-eight per cent of *P. falciparum* infections had an interval of less than 2 weeks although intervals of 6 months and longer can occur[7]. The longest interval recorded here was for a *P. vivax* case; *P. vivax* (and *P. ovale and P. malariae*) tend to have longer incubation periods than *P. falciparum*[7].

DISCUSSION

In 2005, 44 cases of malaria were notified in Ireland. Although malaria has been notifiable for many years, it is likely that there has been under-notification and some of the current increase undoubtedly reflects improved reporting consequent to the Infectious Diseases (Amendment) (No 3) Regulations (S.I. 707 of 2003)[8]. Already in 2006, 36 notifications of malaria have been reported as of mid May 2006 (provisional data).

The majority of cases in 2005 were associated with travel in Africa (91% of those for whom country of infection information was available), parts of West Africa having some of the most intense malaria transmission in the world. Although in 2005, holidaymakers and business travellers formed only a small proportion of the cases reported, between 2001 and 2004 as many as 36% of malaria cases in Ireland specified holiday or business as their reason for travel[9]. The Health Protection Agency (HPA) in the UK has issued a number of advisories over the last couple of years, after several deaths and cases of severe malaria were reported in holidaymakers returning from The Gambia. Many cases had either failed to take any prophylaxis or had taken inadequate or inappropriate prophylaxis.

Increasing numbers of Irish residents were born or raised in countries endemic for malaria. In 2005, visiting family in country of origin was the most common reason given by cases for travel to an endemic region. In the UK, half of malaria cases occur in minority ethnic groups who have settled in the UK, that were visiting family and relations overseas when they acquired malaria[7]. Individuals in endemic regions build up immunity to malaria that fades rapidly while living in a malaria-free region like Ireland, and may wrongly assume that they are still immune to the disease.

Failure to take appropriate prophylaxis and failure to take sensible protection measure against biting mosquitoes are key factors in acquiring malaria. Only one malaria case in Ireland in 2005 reported full compliance with the prescribed course of prophylaxis. The remaining cases either failed to take any malaria prophylaxis prior to exposure or failed to continue prophylaxis for the required time period. It is important that travellers to endemic areas are made aware of the need to be properly compliant with their antimalarial medication and anti-mosquito measures, and the potential health consequences of non- or partial compliance.

The HPA Advisory Committee on Malaria Prevention (ACMP) has published guidelines (and updates) on prevention of malaria[3]. Four steps remain essential to prevent malaria in travellers:

- **A**wareness: know about the risk of malaria
- **B**ites by mosquitoes: prevent or avoid
- **C**ompliance with appropriate chemoprophylaxis.
- **D**iagnose breakthrough malaria swiftly and obtain treatment promptly.

It is important that travellers to endemic areas are aware that

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Useful websites:

- HPSC fact sheet on malaria and links to guidance for professionals. www.hpsc.ie/A-Z/Vectorborne/Malaria/
- WHO Guidelines for the Treatment of Malaria. www.who.int/topics/malaria/en
- The National Travel Health Network and Centre UK: www.NaTHNAC.org
- The Travel Medicine Division (TRAVAX) of the Scottish Centre for Infection and Environmental Health (SCIEH) www.travax.scot.nhs.uk
- Fitfortravel. Scotland. www.fitfortravel.nhs.uk
- The travel section of the Centres for Disease Control and Prevention (CDC), Atlanta. www.cdc.gov/travel/
- Malaria Chapter. WHO's International Travel and Health 2005 Edition. www.who.int/ith/en
- **The following guidance documents are available at:** www.hpa.org.uk/infections/topics_az/malaria/guidelines.htm

  HPA ACMP Guidelines for malaria prevention in travellers for the United Kingdom for 2003

  Update to the Guidelines for malaria prevention in travellers for the United Kingdom for 2003 Published 1 December 2004

  Malaria prophylaxis for long-term travellers

Computerised Infectious Disease Reporting (CIDR) is an information system developed to manage the surveillance and control of infectious diseases in Ireland.

It also monitors organisms' ability to resist antibiotics (anti microbial resistance).

CIDR is a shared national information system for the HSE Areas, the Health Protection Surveillance Centre, the Food Safety Authority of Ireland, the Food Safety Promotion Board and the Department of Health and Children.

CIDR Implementation

Since the update in Epi-Insight in April 2005, the phased national rollout has continued with implementations in the Midlands, the South and the South East during 2005. A major milestone was met by the implementation of CIDR in the South East in October. This included both Public Health and the laboratory in Waterford Regional Hospital. This was the first implementation that included a large regional hospital laboratory and also represented the first implementation of electronic uploads from the iSoft APEX laboratory information system that is used by a significant number of laboratories around the country. More recently CIDR was implemented in Public Health in the North West (February 2006) and will be followed in the near future by the laboratories in Letterkenny and Sligo. Figure 1 illustrates the geographic based CIDR coverage.

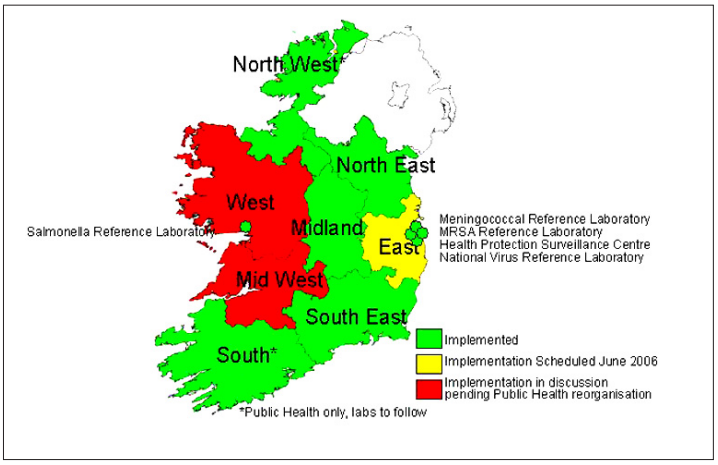

Figure 1. CIDR Implementation May 2006

The CIDR team and our colleagues in the East are now working together to implement CIDR in this region during the summer. Initially it is proposed to implement within Public Health and a limited number of key laboratory notifiers, to be followed by phased implementations in the remaining laboratories. This is a significant challenge for all concerned given the size of the Eastern region together with the large number of laboratories concerned. Once we have met this challenge CIDR will cover 80% of the Irish population. This will then leave only the Midwest and Western regions to be implemented.

CIDR User Group

A CIDR User Group, established in December 2005, is a valuable forum for CIDR users to share experiences and to help communications between CIDR users and the CIDR team. The group meets on a quarterly basis; the next meeting will take place in June.

CIDR and the new European Centre for Disease Prevention and Control (ECDC)

HPSC and the CIDR team hosted a visit from Dr Daniel Faensen and Edward van Straten from the ECDC Unit for Surveillance and Communication in April in preparation for the development of a core database to record anonymised disaggregate infectious disease data within ECDC.

John Brazil, Suzanne Cotter, HPSC

Malaria in Ireland 2005 (continued)

preventive measures are not 100% effective, and that they should seek treatment promptly if they suffer symptoms suggestive of malaria within a year following their return, informing their physician of their travel history.

The guidelines of the HPA Advisory Committee on Malaria Prevention in travellers have also stated the need for balancing the risk of malaria and the risk of adverse reactions to anti-malarials. This depends upon place to be visited, duration of the visit, degree of exposure, level of drug resistance and the type of traveller[3].

Patricia Garvey and Paul McKeown

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