environmental factors may explain why tick populations have not so far become established outside their previous endemic areas.

There is no available vaccine for Lyme borreliosis. Prevention relies on measures to prevent tick bites, such as use of protective clothing and insect repellents, and early detection and removal of ticks. Antibiotics are generally not recommended for prophylaxis after tick bites in Norway.

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ORIGINAL ARTICLES

Surveillance report

EPIDEMIOLOGY OF INVASIVE MENINGOCOCCAL DISEASE IN FRANCE IN 2003

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National surveillance of invasive meningococcal disease (IMD) is based on mandatory reporting. The case definition for surveillance notification was changed in mid-2002 to include cases without microbiological confirmation. The IMD alert detection system was enhanced in 2003 with daily reporting and weekly analysis by district, serogroup, and age. Evaluation of the exhaustivity of the surveillance with capture-recapture analysis allowed correcting for underreporting.

In 2003, 803 cases were reported. After correction for under-reporting, the estimated incidence was 1.78 / 100 000. After excluding 'new' cases reported with new definition criteria, the 2002-2003 increase was 4%. Incidence decreased with age, with the highest values in infants less than 1 year (20/100 000), children aged between 1 and 2 years (11/100 000) and in teenagers of 17 years old(7/100 000). The overall case fatality rate was 12%. Fifty nine per cent of cases were due to serogroup B, 32% to C, 5% to W135, and 4% to Y and non-groupable meningococci. Patients with *purpura fulminans* treated with intravenous antibiotics before admission to hospital were shown to have lower fatality rates than those not treated.

In 2001-2003, 5 situations required particular attention: two clusters of serogroup B IMD had set off mass prophylaxis, one outbreak due to a specific B IMD clonal complex with high case fatality rate, and two districts crossed the alert threshold for serogroup C IMD, 2/100 000, and mass vaccination was recommended.

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Epidemiology of invasive meningococcal disease in France in 2003

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Key Words: meningococcal disease, surveillance, exhaustivity, France

Introduction

Invasive meningococcal disease (IMD) is a rare but serious infectious disease responsible for high case fatality and sequela rates, that affects mainly children and young adults. France, with an incidence below 2/ 100 000 inhabitants, is among those European countries with low incidence [1].This article presents the characteristics of the IMD surveillance in France in 2003, and the recent epidemiological trends.

Methods

In France, IMD is a mandatory notifiable disease. When a new case is reported to the district health authorities, the patient's close contacts in the household and in the community during the 10 previous days of admission are traced, in accordance with the national recommendations [2]. All close contacts are requested to intake chemoprophylaxis and vaccination if appropriate. The notifying clinician or microbiologist fills in a notification form which is sent to the district health authorities, and then to the Institut de Veille Sanitaire (InVS) for national surveillance. Serogrouping of the strains is done at the hospital either after isolation of the strain or using polymerase chain reaction (PCR). Pathogen strains are sent to the National Reference Centre for Meningococci (CNRM) for phenotyping and genotyping analysis. The case definition used for national surveillance was expanded in mid-July 2002 from laboratory confirmed cases with *N. meningitidis* culture or positive antigen

detection in blood, urine or cerebrospinal fluid (CSF) samples, to the new case definition defined by one of the four following criteria: 1) isolation of *N. meningitidis* from a sterile site or from necrotising skin lesions; 2) detection of Gram negative diplococci in CSF ; 3) *Purpura fulminans* ; 4) CSF revealing purulent bacterial meningitis associated with the skin petechial rash and/or positive antigen detection in CSF, blood or urine, and/or positive PCR from CSF or serum.

Data collected for each case are age, sex, clinical symptoms, serogroup, diseases outcome, number of persons targeted for prophylaxis and occurrence of a secondary case (form available on www.invs.sante.fr/surveillance/). Reports are sent to the InVS on a daily basis for monitoring of district incidence (available at www.invs.sante.fr/surveillance/) and detection of clusters. Yearly surveillance reports are published in the *Bulletin Epidémiologique Hebdomadaire* (weekly epidemiological bulletin).

The exhaustivity (number of reported cases divided by total number of cases reported and not reported) of the IMD surveillance is monitored through regular capture-recapture analysis [3, 4, 2000 analysis available on request] and is used to adjust annual incidence. Capture-recapture analysis allows to estimate the real number of cases occurring in a geographical unit by comparing several sources of data. The number of cases captured by several sources is used to estimate the number of cases not captured in any sources [5]. The exhaustivity of the surveillance in France increased from 50% in 1989-1990 to 75% in 2000-2003.

A cluster of cases was defined as the occurrence of more than one case among persons presenting an epidemiological link. Within a cluster, a co-primary case is a case that occurs within 24 hours after of another one ; a secondary case is a case that occurs at least 24 hours after another one.

The population data used for the calculation of incidence were the 1999 census projections from the Institut National de la Statistique et des Etudes Economiques (national institute of statistics and economical studies, INSEE) for 2003.

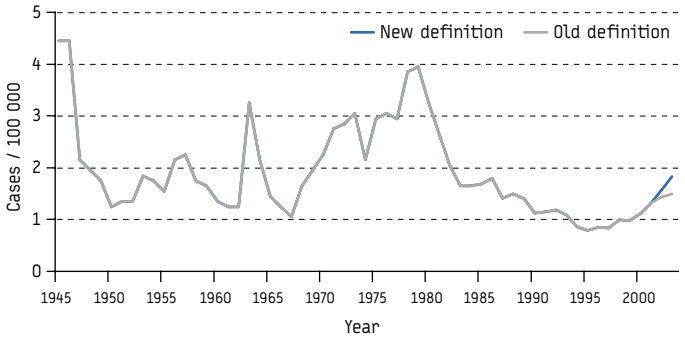
Results

Incidence

In 2003, 803 IMD cases were reported, 796 cases from France mainland and 7 from the overseas departments. From 2002 to 2003, the number of cases increased by 18%. The observed incidence in metropolitan France was 1.3 case /100 000 inhabitants and 1.8/100 000 after adjusting for the under-reporting. The new case definition criteria gave an additional 59 cases in 2002 (9%), and 153 cases in 2003 (19%) in addition of the cases fulfilling the former case definition. After excluding these 'new' cases the 2002-2003 increase was 4%. The incidence of IMD declined from 1980 to 1995 and increased steadily since 1996 [Figure 1].

Figure 1

IMD incidence* from 1945 to 2003, France



* Corrected for under-reporting from 1985 to 2003

National distribution

In 2003, 15 of the 99 french districts presented an incidence greater or equal to 2/100 000 [6]. The highest incidence was observed in the Seine Maritime district (3/100 000). For serogroup C IMD, 5 districts had incidence higher than 1/100 000, with a maximum of 1.5/100 000 in the district l'Ariège; 28 districts reported no serogroup C IMD cases.

Seasonal distribution

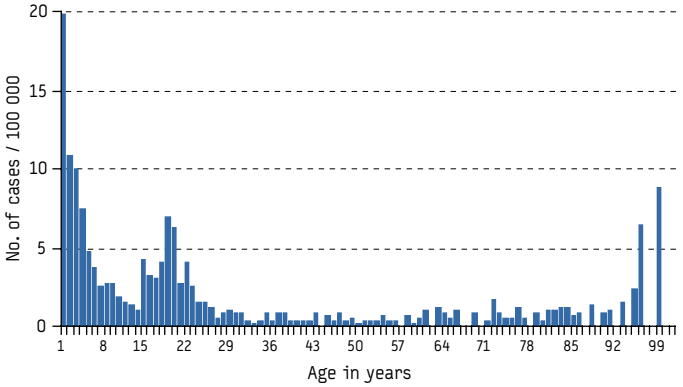
The number of cases increased in winter, starting in December or January, usually at the same time as the influenza epidemic wave. In 2003, the incidence peak was observed in February.

Age and sex distribution

The male/female ratio was 1. The mean age of patients was 18 years, and the median age 13 years. Eighty per cent of cases were in patients under 25 years old. Age-specific incidence showed that infants (<1 year) were more affected than toddlers (1-2 years) [Figure 2]. Incidence decreased slowly up to 12 years of age, and then rose from 13 years of age, reaching a peak at 17 years of age. From 24 to 92 years of age, incidence was less than or equal to 1/100 000.

Figure 2

Specific incidence* by age in years, invasive meningococcal disease, France, 2003



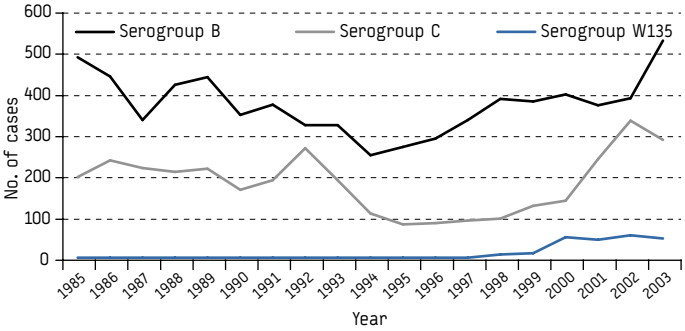
* Corrected for under-reporting

Serogroup distribution

In 2003, 668 cases (83%) were serogrouped. Among those, serogroup B represented 59% of cases; serogroup C, 32%; serogroup W135, 5%; and the other serogroups (A, 2 cases; Y, 19 cases; and non-groupable, 2 cases) represented 4% of cases. In 2002, the incidence of serogroup C IMD had reached a peak, with 250 cases representing 42% of all serogrouped cases. This was the highest value observed in France since 1985 (when the first serogrouped data became available) [Figure 3]. In 2003 the incidence of serogroup C IMD decreased to a more usual proportion and numbers. This trend continued in 2004.

Figure 3

Number of IMD cases* according to the main serogroups, France, 1985-2003



* Corrected for under-reporting

Clinical presentation

In 2003, 631 (79%) patients presented with meningitis, and 291 (36%) presented with septicaemia, of whom 172 also had meningitis. Eight patients presented with arthritis and one patient had meningococcal pericarditis. Of the cases for which data on clinical symptoms only is available, 73 (57%) were confirmed with *purpura fulminans* and 54 (43%) with purulent CSF associated with purpura or soluble antigens or positive PCR.

Severity of the disease and outcome

The overall proportion of cases with *purpura fulminans* increased from 23% in 2001 to 30% in 2002 and 28% in 2003 (p=0.01) [5]. The cases with *purpura fulminans* without laboratory confirmation were responsible for 16% and 34% of the increase of *purpura fulminans* in 2002 and 2003 respectively. The outcome of the disease was known for 94% of the cases. The 16% case fatality rate (CFR) observed in 2002 declined to 12% in 2003. The CFR was higher in the presence of *purpura fulminans* (p<0.001) and varied according to age (p<0,001) and serogroup (p=0.002) (TABLE).

TABLE

Number of IMD cases and deaths depending on the presence of absence of *purpura fulminans*, France, 2001-2003

	With *purpura fulminans*		Without *purpura fulminans*	
Age group in years	Cases (n)	Case fatality rate (%)	Cases (n)	Case fatality rate (%)
<2	131	42.7	263	1.9
2-14	189	27.0	337	2.4
15-24	128	24.2	280	2.9
25-99	87	51.7	292	12.0
Total	535	34.2	1172	4.8
Serogroup				
B	219	33.8	580	2.8
C	183	37.2	358	8.1
W135	19	63.2	66	7.6
Other	14	35.7	42	9.5
Total	**435**	**36.6**	**1046**	**5.2**

However, the higher CFR in serogroup C and W135 cases may be due to a higher proportion of isolates belonging to the clonal complex ET-37/ST-11 among serogroup C and W135 isolates.

Between 2002 and 2004, of 507 patients with *purpura fulminans* and known evolution, 206 (41%) were given intravenous antibiotic treatment before admission to the hospital. The risk of death was lower in the group that had received antibiotic injection (24%) than in the group that did not received it (35%) (p=0.01) before admission.

Clusters of IMD cases and specific prevention measures

In 2003, 14 clusters were documented: 8 with co-primary cases, 4 with secondary cases, and 2 with co-primary and secondary cases. The 12 secondary cases identified accounted for 1.4% of all IMD cases. This proportion has been stable for the past 10 years [7].

Mass chemoprophylaxis campaign:

1. During spring 2003, chemoprophylaxis was recommended to 50 students after the occurrence of a cluster of four serogroup B IMD cases among teenagers attending a boarding school in Nantes and their close contacts. This measure was aimed at limiting the spread of the pathogenic strain into the general population when the students returned home for the school holidays.
2. During the summer of 2003, chemoprophylaxis was offered to 8000 people living in an urban neighbourhood of Metz, after the occurrence of seven cases of serogroup B belonging to the clonal complex ET5/ST32 within an 18 day period, among children within an extended family and other children living in that the same neighbourhood. The attack rate for cases without direct contact was 17/100 000. More than 86% of residents presented to healthcare services to receive rifampicin, and no new case was reported after the measure was implemented.

Awareness campaign

In a defined geographical area including the town of Dieppe and the surrounding area in the Seine Maritime district, the annual incidence was 12 cases/100 000 inhabitants in 2003 and 2004, with 40% of cases presenting *purpura fulminans*. *N. meningitidis* B14:P1.7,16, belonging to the clonal complex ET5/ST32, was isolated in 8 out of 10 cases in 2003. This clonal complex is characterised by high virulence and has been responsible for outbreaks in others Europeans countries[8]. Information campaigns were launched, targeting clinicians and the general population, for prompt recognition of the cases to shorten the time between onset of illness and start of medical treatment. The number of fatal cases decreased from 8/32 cases to 4/28 cases between 2003 and 2004.

Vaccination campaign against C meningococci

1. In January 2002, in the Puy-de-Dôme district, a vaccination campaign targeting around 100 000 children and young people aged between 2 months to 20 years old was carried out to stop the rapid increase of serogroup C IMD incidence (5 cases /100 000 inhabitants in Clermont-Ferrand) in that population. Many of these cases were presenting with *purpura fulminans* [9]. At the end of the campaign, vaccine coverage reached more than 80% of the target population.
2. At the end of 2002, a similar campaign targeting around 300 000 people was set up in three districts in southwest France, where the mean incidence for serogroup C IMD had reached 2.2/100 000 [10]. At the end of the campaign, vaccine coverage reached more than 85% of the target population.

In these two regions, the incidence of serogroup C IMD declined after the vaccination campaigns and has since remained low. No significant increase of serogroup B IMD incidence was observed in 2003 or 2004.

Discussion

In France, the incidence of IMD has been steadily increasing since 1996. In 2003, the slope of the increase slowed down and in 2004 the incidence of IMD decreased for the first time for 10 years. The case definition adopted in 2002 allowed the inclusion of non-laboratory confirmed cases and increased the reporting sensitivity for the disease in France. The recommendations for the pre-admission antibiotic injection when a *purpura fulminans* was suspected were published in 2001 and we expected that the number of cases without laboratory confirmation would increase. Therefore the case definition was revised according to this recommendation and to new laboratory diagnosis practices. Some *purpura fulminans* may be due to *Streptococcus pneumonia* but the main cause of *purpura fulminans* remains *N. meningitidis*. The administration of intravenous antibiotic treatments before admission to hospital for cases with *purpura fulminans* seems to be associated with a lower case fatality rate. However, surveillance data do not allow us to conclude that there is a causative association. Although a decrease in the CFR was observed in the Seine Maritime district after the public awareness campaign, we have no information on interval between onset of symptoms and start of medical treatment before and after this campaign.

In 2001 and 2002, a national increase of serogroup C IMD was observed in France and in several other European neighbouring countries. The alert threshold of C IMD (incidence > 2/100 000 with at least 5 cases occurring in 52 weeks in a district) [11] was crossed twice, and local vaccination campaigns implemented in response. The impact of the campaigns was excellent and high vaccine coverage were rapidly reached. In February 2003, the General Direction of Health decided not to recommend general vaccination for children and

teenagers in France [12]. This decision was based on the low incidence of C IMD cases in France, 0.4/100 000 in 2002, compared with the incidence in European countries that had introduced Men C routine childhood vaccination (ranging from 1.9 to 4 cases per 100 000), and took into account the theoretical risk of a capsular switch induced by vaccination. In 2003 and 2004, national incidence of C IMD decreased and the district incidences remained under the alert threshold for serogroup C IMD.

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ORIGINAL ARTICLES

Surveillance report

'DID YOU HAVE FLU LAST WEEK?' A TELEPHONE SURVEY TO ESTIMATE A POINT PREVALENCE OF INFLUENZA IN THE SWEDISH POPULATION

L Payne[1,2], S Kühlmann-Berenzon[1], K Ekdahl[1], J Giesecke[1], L Högberg[1], P Penttinen[1]

Sentinel surveillance usually underestimates the true burden of influenza in a population, as individuals must present to medical establishments to be included in the surveillance system. We carried out a telephone survey to estimate the national burden of influenza in the Swedish population for one week during the 2004/05 influenza season. Fixed-line telephone numbers were randomly sampled and households interviewed concerning influenza illness between 14-20 February 2005 (Week 7 of 2005). Questions regarding seasonal influenza vaccination status, symptoms and the impact of illness on daily life were also included. A self-defined influenza prevalence of 7.7% in week 7 of 2005 was estimated. On applying a case definition of 'cough and fever and muscle pain' for influenza like illness, the prevalence decreased to 3.6%. The survey provided insight into the burden of illness in the population further to that estimated through the sentinel surveillance system.

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Key Words: cross-sectional survey, influenza, prevalence, Sweden

Introduction

Influenza A or B viruses circulate every winter in the northern hemisphere, approximately between the months of October and April. Though influenza disease is usually self-limiting, it causes a considerable impact on an individual's daily life, affects the demand for health services and can create economic loss. The burden of influenza falls particularly on groups especially prone to complications or fatal outcome, such as the very young [1], the elderly [2] or the chronically ill.

Assessing the annual level of morbidity due specifically to influenza A or B viruses is however difficult, as the viruses lack pathognomonic features and co-circulate with other respiratory pathogens [3]. Consequently, many surveillance systems across Europe aim to identify a level of illness possibly caused by influenza viruses, i.e., influenza-like illness (ILI). A definitive set of symptoms for a clinical diagnosis of influenza has been difficult to achieve, and the ILI definition varies widely across Europe [4].

Reports of ILI are the basis of the influenza sentinel surveillance system in Sweden, where participating physicians from specific sites across the country report weekly number of ILI cases. No case definition for influenza or ILI is used. Together with laboratory reporting of influenza positive tests, the surveillance system allows a timely overview of the level and duration of influenza circulating in a season. However, the sentinel and laboratory surveillance systems depend on symptomatic individuals presenting to a physician for consultation. They thus underestimate the true burden of illness caused by influenza, since milder cases, clustered family cases, or severely affected individuals living alone, may not seek medical attention.

To understand the difference between measured (surveillance system) and the true burden of influenza illness in the Swedish population, we carried out a survey to estimate a point prevalence of self-reported influenza in the national population during one week

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