13. Emmerson AM, Enstone JE, Griffin M, Kelsey MC, Smyth ET. The Second National Prevalence Survey of infection in hospitals--overview of the results. J Hosp Infect. 1996;32(3):175-90.
14. Gastmeier P, Kampf G, Wischnewski N, Hauer T, Schulgen G, Schumacher M, Daschner F, Ruden H. Prevalence of nosocomial infections in representative German hospitals. J Hosp Infect. 1998;38(1): 37-49
15. Gikas A, Pediatitis I, Roumbelaki M. Repeated multi-centre prevalence surveys of hospital-acquired infection in Greek hospitals. CICnet. Cretan Infection Control Network. J Hosp Infect. 1999;41(1): 11-8.
16. Vlahovic-Palcevski V, Francetic I, Palcevski G, Novak S, Bergman U. Antimicrobial prescribing at a university hospital: justified or 'just in case':testing a new scoring system as a key quality indicator. Pharmacoepidemiol Drug Saf. 2005;14(8):561-6.
17. Harbarth S, Ruef C, Francioli P, Widmer A, Pittet D. Nosocomial infections in Swiss university hospitals: a multi-centre survey and review of the published experience. Swiss-Noso Network. Schweiz Med Wochenschr. 1999;129(42):1521-8.
18. Pittet D, Hugonnet S, Harbarth S, Mourouga P, Sauvan V, Touveneau S, Perneger TV. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Infection Control Programme. Lancet. 2000;356(9238):1307-12.
19. Gastmeier P, Brauer H, Hauer T, Schumacher M, Daschner F, Ruden H. How many nosocomial infections are missed if identification is restricted to patients with either microbiology reports or antibiotic administration? Infect Control Hosp Epidemiol. 1999;20(2):124-7.
20. Haley RW, Culver DR, White JW, Morgan WM, Emori TG, Munn VP, Hooton TM. The efficacy of infection control programs in preventing nosocomial infections in U.S. hospitals. Am J Epidemiol. 1985;121(2):182-205

ORIGINAL ARTICLES

Euroroundup

PNEUMOCOCCAL DISEASE SURVEILLANCE IN EUROPE

RG Pebody[1], W Hellenbrand[2], F D'Ancona[3], P Ruutu[4], on behalf of the European Union funded Pnc-EURO contributing group*

Pneumococcal disease (Pnc) is responsible for invasive pneumococcal disease (IPD) – mainly meningitis and septicaemia - and is an infection of public health importance in Europe. Following the licensure of an effective conjugate vaccine (PCV) in Europe, several European countries, including France, Germany, the Netherlands, Norway, Spain and the United Kingdom, are introducing universal Pnc childhood immunisation programmes. As part of a European Union (EU) funded project on pneumococcal disease (Pnc-EURO), a questionnaire was distributed in late 2003 to each of the current 25 European Union member states as well as Norway and Switzerland to get a clearer picture of national surveillance for invasive pneumococcal disease (IPD) in Europe. All respondents were contacted in 2006 and asked to provide an update to the questionnaire.

Twenty two of the 27 countries targeted completed and returned the questionnaire. Four of the 22 responding countries have no reporting requirement for IPD. Eighteen countries reported a total of 27 national surveillance systems. Case definitions employed in these systems differed. Fourteen of the 18 countries reported collection of IPD strains to a single reference lab for serotyping and in 12 countries to a single laboratory for susceptibility testing. Thirteen countries undertook laboratory quality assurance. Information on age and sex were widely collected, but only 11/27 systems collected information on pneumococcal polysaccharide vaccine status, while 5/27 systems collected information on pneumococcal conjugate vaccine status. The incidence of IPD reported in each of the 18 countries ranged from 0.4 to 20/100 000 in the general population, with a total of 23 470 IPD cases reported over a 12 month period. Surveillance for IPD in Europe is very heterogeneous. Several countries lack surveillance systems. Large differences in reported disease incidence may reflect both true differences, and also variations in patient and healthcare factors, including surveillance. If IPD surveillance in Europe can be strengthened, countries will be able to make informed decisions regarding the introduction of new pneumococcal vaccines and also to monitor and compare the impact and effectiveness of new programmes.

Euro Surveill. 2006;11(9): 171-8 Published online September 2006

1. Health Protection Agency, London, England
2. Robert Koch-Institut, Berlin, Germany
3. Istituto Superiore di Sanità, Rome, Italy
4. Kansanterveyslaitos, Helsinki, Finland

Key words: Invasive pneumococcal disease, surveillance systems, conjugate and polysaccharide vaccines

Introduction

Pneumococcal disease (Pnc) has been highlighted as an infection of public health importance in Europe [1]. It has a wide range of clinical manifestations, particularly in young children and older persons. These range from less frequent invasive disease (IPD), presenting mainly as meningitis and septicaemia, to more common but generally non-invasive conditions such as pneumonia, sinusitis and otitis media. Increasing antimicrobial resistance, particularly to penicillin and erythromycin, has occurred in certain parts of Europe [2]. However, the true burden due to pneumococcal disease in Europe is uncertain. Differences in the incidence of IPD have been well-documented, and explained (at least partly) by patient and healthcare factors such as blood culture practice and pre-admission antibiotic administration [3].

A 23-valent Pnc polysaccharide vaccine (PPV) was licensed in Europe during the 1980s and targeted at groups at higher risk of invasive pneumococcal disease. In recent years, many European countries have introduced PPV into national immunisation schedules for all elderly people [4]. A new 7-valent Pnc conjugate vaccine (PCV) has been recommended in the United States national immunisation programme for all children since 2000, where reductions in IPD due to vaccine serotypes in both vaccinated and - indicative of a herd immunity effect - in older, unvaccinated cohorts have been observed [5,6]. In the US, there is now increasing evidence of the emergence of non-vaccine serotypes ('serotype replacement') for both invasive and non-invasive disease [6,7,8]. In 2001, PCV was licensed in Europe [9]. At first, a number of European countries introduced PCV for children at higher risk of Pnc disease [4]. More recently, several countries in Europe, including Norway [10], France [11], Germany [12], the Netherlands [13], Spain and the UK [14], have introduced or are planning to introduce PCV into their routine childhood immunisation programmes. Programmes vary both in the number of doses recommended in the primary course (two doses in UK and Norway versus three in France, Germany and the Netherlands), the age of administration (3 and 5 months in Norway and 2, 3 and 4 months in France, Germany and the Netherlands), the use of a catch up campaign (e.g. UK) and co-administration with other vaccines.

One of the main objectives of the EU funded project, Pneumococcal Disease in Europe (Pnc-Euro) was to establish the epidemiology of *Streptococcus pneumoniae* in a variety of European countries prior to

the large-scale introduction of new pneumococcal conjugate vaccines, and to implement an inventory of existing pneumococcal surveillance programmes. This paper summarises the findings of a questionnaire survey of Pnc surveillance practice in the EU.

Methods

A standardised questionnaire was designed and sent in late 2003 to the national public health institutes of each of the current 25 European Union member states, and to Norway and Switzerland. Ten of the EU countries were in the accession phase at this time. The countries included in the survey (including initial non-responders) were approached again early in 2006, with a request for an update on any changes in pneumococcal surveillance since the original questionnaire. Data from the returned questionnaires were entered into a database using EpiData software and analysed using Epi Info 6.

Results

Twenty two of the 27 countries included in the survey completed and returned the questionnaire (response rate 81%). The non-responders were Austria, Greece, Hungary, Portugal and Spain.

Four (Cyprus, Estonia, Latvia and Luxembourg) of the 22 responding countries stated there was no specific reporting requirement for pneumococcal disease within their national communicable disease surveillance system. The remaining 17 countries reported 26 routine Pnc surveillance systems, and Germany reported a system initially established as a research programme [TABLE 1]. Four of these 18 countries (Czech Republic, Denmark, Ireland and Poland) reported two surveillance systems for pneumococcal disease and two countries (France and Belgium) reported three. The earliest of these systems were established in the 1930s, although the majority began during the 1990s. One of the Belgian surveillance systems (Pedisurv) was only established in 2005.

System objectives

Only one the 27 reported Pnc surveillance systems had no specific objective [TABLE 1]. The main system objectives mentioned were to monitor IPD incidence/trends (n=20), to monitor antimicrobial susceptibility (AMR, n=15), to monitor the impact of interventions (n=15), to monitor circulating serotypes (n=12), to detect outbreaks/clusters (n=4), to monitor Pnc meningitis incidence (n=2) and to identify risk factors (n=1).

TABLE 1

Pneumococcal disease surveillance systems in the European Union and the stated system objectives (23 countries), 2006[1]

Country	Surveillance system	Name of Pnc surveillance system	Year started	Monitor incidence	Monitor AMR	Monitor impact	Monitor serotypes	Detect outbreaks
Belgium	Yes	ID sentinel laboratory system	1986	Y		Y		Y
		Pedisurv	2005	Y		Y	Y	
		National Pnc reference laboratory	1980	Y	Y	Y	Y	
Cyprus	No	-	-	-	-	-	-	-
Czech Republic	Yes	EPIDAT	1994	Y				
		National Streptococci Reference Lab	1997		Y		Y	
Denmark	Yes	National notification system	1980	Y		Y		Y
		National laboratory surveillance	1938	Y	Y	Y	Y	
England & Wales	Yes	National enhanced surveillance	1996	Y	Y	Y	Y	
Estonia	No	-	-	-	-	-	-	-
Finland	Yes	National ID register	1995	Y	Y		Y	
France	Yes	EPIBAC	1995	Y		Y		
		CNRP-ORP	2001		Y	Y	Y	
		GPIP-ACTIV (meningitis)	2001		Y	Y		
Germany	Yes	ESPED	1997	Y	Y		Y	
Ireland	Yes	EARSS-Ireland	1999		Y			
		Pnc meningitis system	1999	Y		Y		Y
Italy	Yes	Bacterial meningitis surveillance	1994	Y				
Latvia	No	-	-	-	-	-	-	-
Lithuania	Yes	Pnc meningitis surveillance						
Luxembourg	No	-	-	-	-	-	-	-
Malta	Yes	EARSS-Malta	2000		Y			
Netherlands	Yes	NRBM	1975	Y	Y	N#	N#	
Norway	Yes	MSIS	1977	Y	Y	Y	Y	Y
Poland	Yes	National ID surveillance	1970	Y				
		NRCBM	1997	Y	Y	Y	Y	
Scotland	Yes	SPIDER	1999	Y	Y	Y	Y	
Slovak Republic	Yes	EPIS	1960	Y		Y		
Slovenia	Yes	Epidemiology invasive disease	1993			Y		
Sweden	Yes	Laboratory reporting system	1990	Y				
Switzerland	Yes	National surveillance of IPD	1999	Y	Y		Y	

Y: Yes N: No

From 2006, will include these objectives when Pnc conjugate vaccine (PCV) is introduced

1. In the table, Scotland and England and Wales were counted separatly. In the text, both countries are grouped under UK

Table 2

Pneumococcal disease surveillance systems in the European Union and case definitions used (19 countries), 2006[1]

Country / Name of surveillance system	Surveillance of *S. pneumoniae*	Statutory system	Clinical syndrome surveillance	Clinical surveillance		Case definition	Case definition			
				Meningitis	Sepsis		Isolation from CSF	Isolation from blood	Non-culture methods	Time interval between cases
Belgium										
ID sentinel laboratory system	Y	N	N	N	N	Y	Y	Y	Y	10 weeks
Pedisurv	Y	N	N	N	N	Y	Y	Y	Y	
National Pnc reference laboratory	Y	N	N	N	N	Y	Y	Y		
Czech Republic										
EPIDAT	Y	Y	Y	Y	N	Y	Y	Y	Y	
National Streptococci Reference Lab	Y	N	Y	Y	Y	Y	Y	Y	Y	
Denmark										
National notification system	N	Y	Y	Y	N	Y	Y	N		
National laboratory surveillance	Y	N	N	N	N	Y	Y	Y		30 days
England & Wales	Y	N	Y	Y	Y	Y	Y	Y		
Finland	Y	Y	N	N	N	Y	Y	Y		3 months
France										
EPIBAC	Y	N	N	N	N	Y	Y	Y		
CNRP-ORP	Y	N	N	N	N	Y	Y	Y	N	
GPIP-ACTIV (meningitis)	N	N	Y	Y	N	Y	Y	Y	Y	
Germany	Y	N	N	N	N	Y	Y	Y	N	1 week
Ireland										
EARSS-Ireland	Y	N	N	N	N	Y	Y	Y		
Pnc meningitis system	N	N#	Y	Y	N	N##	N##	N##		
Italy	Y	N	Y	Y	N	Y	Y	N	Y	
Lithuania	N#	N#	Y	Y	N	Y	Y	Y		
Malta	Y	N	N	N	N	Y	Y	Y		3 months
Netherlands	Y	N	N	N	N	Y	Y	Y		
Norway	Y	Y	N	N	N	Y	Y	Y	Y	
Poland										
National ID surveillance	N	Y	Y	Y	Y	Y	Y	Y		
NRCBM	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Scotland	Y	N	N	N	N	Y	Y	Y		2 weeks
Slovak Republic	N	Y	Y	Y	Y	Y	Y	Y		
Slovenia	Y	Y	Y	Y	Y	Y	Y	Y		
Sweden	Y	N#	N	N	N	Y	Y	Y		
Switzerland	Y	Y	N	N	N	Y	Y	Y	Y	

Y: Yes N: No

Since 2004, invasive pneumococcal disease (IPD) became mandatory notifiable ## Case definition implemented in 2004

1. In the table, Scotland and England and Wales were counted separatly. In the text, both countries are grouped under UK

Reporting systems

In 2003, nine of the 27 Pnc surveillance systems were statutory and 18 were non-statutory [TABLE 2]. By 2006, IPD notification had become mandatory in Ireland, Lithuania and Sweden.

In 21 of the 27 systems, surveillance was specifically for the pathogen *S. pneumoniae*. In 12 systems, surveillance for a clinical syndrome was undertaken. For these 12 systems, the clinical syndromes under surveillance were meningitis (n=12), sepsis (n=6) and other (n=1).

Case definitions

Twenty six of the 27 systems had reporting case definitions in 2003 [TABLE 2]. Ireland introduced a case definition in 2004. In general, the case definition included isolation of Pnc from CSF (n=26) and blood (n=24). Besides bacterial culture, at least nine countries included PCR as a method of laboratory confirmation in the case definition.

In those systems specifying a time interval between illness episodes to define a new case in the same individual, duration ranged from seven days to three months.

Target population

The target population under surveillance was all age groups for 24 of the 27 surveillance systems. The German ESPED, Belgium Pedisurv and French GPIP-ACTIV systems focused on children under 16, 15 and 18 years of age respectively. No country reported a specific Pnc surveillance system focused on a certain risk group (e.g. the military).

Twenty three of the Pnc surveillance systems were reported to be national, population based reporting systems and four were sentinel (three in France and one in Belgium). The latter were reported to have coverage of 73% for EPIBAC in France, 63% for CNRP-ORP in France, 70% for GPIP-ACTIV in France and 79% in Belgium for ID sentinel laboratory system.

Twenty of the Pnc surveillance systems were based on laboratory notifications and twelve on clinician notifications [TABLE 3]. Five countries (Belgium, Germany, Norway, Poland (NRCBM) and Switzerland) used both reporting sources, and in other countries, physicians were responsible for reporting laboratory confirmed cases to the national surveillance system.

Laboratory surveillance

Pnc findings reported by the laboratory were from CSF (n=21), blood (n=20) and other sites (n=16) [TABLE 3]. Other sites included any other normally sterile site (n=10 countries., Other sites specifically mentioned included (with some countries mentioning more than one

TABLE 3

Pneumococcal disease surveillance in the European Union and laboratory surveillance (27 surveillance systems), 2006

Country / Name of surveillance system	Notification by clinicians	Notification by laboratory	Laboratory notifications			Central reference laboratory	% samples serotyped	Collect information on AMR	% samples with susceptibility
			CSF	Blood	Other sites				
Belgium									
ID sentinel laboratory system	N	Y	Y	Y	Y	Y	NA	Y	99
Pedisurv	Y	Y	Y	Y	Y	Y	72	Y	72
National Pnc reference laboratory	N	Y	Y	Y	Y	Y	100	Y	100
Czech Republic									
EPIDAT	N	Y	Y	N	N	Y			
National Streptococci Reference Lab	N	Y	Y	Y	Y	Y	100	Y	100
Denmark									
National notification system	Y	N				Y	100	N	
National laboratory surveillance	N	Y	Y	Y	Y	Y	100	Y	100
England & Wales	N	Y	Y	Y	Y	Y	66	Y	70
Finland	N	Y	Y	Y	N	Y	90	Y	90
France									
EPIBAC	N	Y	Y	Y	N	Y	NA	N	
CNRP-ORP	N	Y	Y	Y	Y	Y	100 (≤15) 20 (>15)	Y	100
GPIP-ACTIV (meningitis)	Y	N	N	N	N	Y	68	Y	89
Germany	Y	Y	Y	Y	Y	Y	51	Y	48
Ireland									
EARSS-Ireland	N	Y	Y	Y	N	N		Y	100
Pnc meningitis system	Y	N				N		N	
Italy	Y	N				Y	NA	N	
Lithuania	Y	N	Y	Y	Y	N	3	Y	100
Malta	N	Y	Y	Y	N	N		Y	100
Netherlands	N	Y	Y	Y	Y	Y	100	Y	100
Norway	Y	Y	Y	Y	Y	Y	80	Y	0
Poland									
National ID surveillance	Y	N	N	N	N	N		N	
NRCBM	Y	Y	Y	Y	Y	Y	100	Y	100
Scotland	N	Y	Y	Y	Y	Y	85	Y	85
Slovak Republic	Y	N				N	5	Y	60
Slovenia	N	Y	Y	Y	Y	Y	100	Y	100
Sweden	N	Y	Y	Y	Y	N	25	N	
Switzerland	Y	Y	Y	Y	Y	Y	70	Y	70

Y: Yes *N: No*

site): joint (n=3), pleural effusion (n=3), peritoneum (n=2), middle ear (n=1) and sputum (n=2).

Fourteen of 18 countries reported that Pnc strains were collected to a single central reference level within the surveillance system for serotyping [TABLE 3]. In at least one country (Italy), the information was not integrated into the Pnc surveillance system. The proportion of Pnc isolates serotyped on average ranged between countries from 3% to 100%.

Twelve countries reported that a single reference laboratory undertook susceptibility testing. In two countries, this was undertaken by more than one laboratory [TABLE 3]. In France and Slovenia, there were 22 and 10 laboratories respectively undertaking Pnc antimicrobial susceptibility testing as a reference function. Of the 27 Pnc surveillance systems, 20 collected information on Pnc antimicrobial susceptibility. At least one country (Italy) reported that the information was not integrated into the surveillance system. The proportion of Pnc isolates tested for antimicrobial susceptibility ranged from 0 to 100%.

Laboratory quality assurance

Ten of the 18 countries reported that national protocols/guidelines were in place for microbiology laboratories to guide sampling, transportation and identification of Pnc. In thirteen countries, clinical microbiology laboratories undertook national quality assurance for Pnc either regularly or occasionally. In twelve countries, laboratories took part in international quality assurance.

Data collected

Data collected on each case in the 27 Pnc surveillance systems in 2003 included age (n=26), sex (n=24), unique ID (n=17), clinical presentation (n=20), outcome (n=17), PPV vaccination status (n=11), PCV vaccination status (n=5) and risk factors (n=8). Several countries plan to collect information in the future on PCV vaccination status with the introduction of universal infant immunisation programmes. The proportion missing for each variable by system is summarised in table 4.

Using the available ID, all 13 countries that used unique ID, and plus Germany and Belgium (Pedisurv) which both use an algorithm comparing identifiers common to both systems, linked multiple laboratory notifications recorded within the timespan specified in the case definition into a single case.

Data dissemination

Data collected by the 27 surveillance systems was disseminated through a publicly available website for 17 systems and through a national epidemiological bulletin for 16 systems [TABLE 5]. Twelve

systems have published surveillance findings in biomedical journals. Three countries have original data publicly accessible outside the surveillance network.

Available data

Recent surveillance data for IPD and Pnc meningitis is summarised in table 6. The number of IPD cases reported in one year was 23 470 cases from 18 countries, with the incidence of IPD ranging from 0.4 (Lithuania and Italy) to 20/100 000 general population (Denmark and Norway).

Of all these IPD cases, the total number of Pnc meningitis cases was 2193 from ten countries. The reported incidence of Pnc meningitis ranged from 0.3 (Poland and Slovak Republic) to 1.8/100 000 (Denmark). The proportion of isolates non-susceptible to penicillin in all age-groups ranged from 0 (Malta) to 43% (France).

Key reported limitations

Respondents identified a number of limitations to the surveillance systems. This included the infection not being notifiable (Estonia) or not being statutorily notifiable (Ireland, Scotland, Sweden, Denmark, Germany). Case reporting was identified as being incomplete by several countries (including Lithuania, Ireland, Germany), compounded by factors such as low blood sampling rates (Germany and Poland) and the presence of a limited number of laboratories (Italy). Other reported limitations included lack of data on Pnc pneumonia and sepsis (Czech republic), lack of reliable data on Pnc septicaemia (Netherlands, Denmark); a lack of clinical data (Ireland, Slovenia, Norway, Denmark and Belgium); lack of outcome data (the Netherlands); lack of data on vaccination status (Belgium); lack of information on serotypes (Belgium, Norway, Sweden); only aggregate data available at national level (Lithuania and Poland); lack of data on vaccine coverage to interpret epidemiological changes (Belgium) and only limited personal identifiers available thus limiting the ability to link databases and to de-duplicate (Switzerland and Sweden).

Conclusions

This paper is the first to provide an overview of the structure and outputs of national surveillance systems for invasive *S. pneumoniae* infection in Europe. There are weaknesses to the study, including of the level of non-responders. However, a number of key points can be learnt:

- Surveillance systems for invasive pneumococcal disease in Europe are very heterogeneous;
- Although several countries have strengthened their surveillance since the original survey, a number of countries still had no IPD surveillance in place in 2006, and a number of others only had surveillance for Pnc meningitis;
- Although the European Union has established a standard case definition (2002/253/EC), at least for international reporting, case definitions (CD) for invasive pneumococcal disease are not standardised across Europe especially with regard to use of non-culture methods and of time interval between cases;

Table 4

Pneumococcal disease surveillance in the European Union and data collected (27 surveillance systems), 2006

Country / Name of surveillance system	Age	% age missing	Sex	% sex missing	Unique ID	Clinical present	% clinical missing	Outcome	% outcome missing	PPV status	PCV status	Risk factors
Belgium												
ID sentinel laboratory system	Y	1	Y	1	Y	N		N		N	N	N
Pedisurv	Y	0	Y	0	Y	Y	44	Y	NA	Y	Y	Y
National Pnc reference laboratory	Y	0	Y	1	Y	Y	46	Y	31	Y	N	N
Czech Republic												
EPIDAT	Y	0	Y	0	Y	Y	0	Y	0	N	N	N
National Streptococci Reference Lab	Y	NA	Y	NA	Y	Y	NA	Y	NA			
Denmark												
National notification system	Y	0	N		Y	Y	0	Y	5	Y	N	Y
National laboratory surveillance	Y	0	Y	0	Y	N		N		N	N	N
England & Wales	Y	NA	Y	NA	Y	Y	80	Y	80	Y	N#	Y
Finland	Y	0	Y	0	Y	N		N		N	N	N
France												
EPIBAC	Y	0	Y	1	N	N		N		N	N	N
CNRP-ORP	Y	NA	Y		N	Y	NA	N		N	N	N
GPIP-ACTIV (meningitis)	Y	0	Y	1	N	Y	0	Y	1	Y	Y	Y
Germany	Y	0	Y	1	N	Y	0	Y	41	Y	Y	Y
Ireland												
EARSS-Ireland	Y	1	Y	1	Y	N		N		N	N	N
Pnc meningitis system	Y	0	Y	0	Y	Y	0	Y	0	N	N	N
Italy	Y	2	Y	0	Y	Y	0	Y	15	N	N	N
Lithuania	N		N		N	Y	0	N		N	N	N
Malta	Y	0	Y	0	Y	N		Y	0	N	N	N
Netherlands	Y	1	Y	1	N	Y	50	N		N	N#	N
Norway	Y	0	Y	0	Y	Y	13	Y	25	Y	N	N
Poland												
National ID surveillance	Y	0	N		N	Y	0	N		N	N	N
NRCBM	Y	5	Y	5	Y	Y	5	Y	70	Y	N	Y
Scotland	Y	0	Y	0	N	Y	19	Y	8	Y	N#	Y
Slovak Republic	Y	1	Y	1	N	Y	10	Y	0	Y	Y	N
Slovenia	Y	1	Y	5	Y	Y	35	Y	100	N	N	N
Sweden	Y	5	Y	5	N	N		N		N	N	N
Switzerland	Y	0	Y	0	Y	Y	17	Y	35	Y	Y	Y

Y: Yes N: No

 # Vaccination status of cases is collected since 2006

Table 5

Pneumococcal disease surveillance in the European Union and data dissemination (27 surveillance systems), 2006

Country / Name of surveillance system	Web	URL	Bulletin	Bulletin name	URL
Belgium					
ID sentinel laboratory system	Y	www.iph.fgov.be/epidemio/labo	Y	Rapports mensuels sur la surveillance des maladies	
Pedisurv	Y	www.iph.fgov.be/epidemio/epien/index32	N		
National Pnc reference laboratory	Y	www.iph.fgov.be/epidemio/epien	N		
Czech Republic					
EPIDAT	N		N		
National Streptococci Reference Lab	N		N		
Denmark					
National notification system	Y	www.ssi.dk	Y	EPI-NYT/EPI-NEWS	www.ssi.dk (epi-data)
National laboratory surveillance	N		Y	Epi-Nyt/Epi News	
England & Wales	Y	www.hpa.org.uk/infections/topics_az/pneumococcal/data.htm	Y	CDR weekly	www.hpa.org.uk/cdr
Finland	Y	www.ktl.fi/ttr	Y	Kansanterveyslehti	www.ktl.fi/portal/suomi/julkaisut/kansanterveyslehti
France					
EPIBAC	Y	http://www.invs.sante.fr/surveillance/epibac/default.htm	N		
CNRP-ORP	N		Y	Bulletin Epidemiologique Hebdomadaire	
GPIP-ACTIV (meningitis)	Y	http://193.251.4.4:9000/index.html	N		
Germany	Y	www.esped.uni-duesseldorf.de/	N		
Ireland					
EARSS-Ireland	Y	www.ndsc.ie	Y	EARSS newsletter	
Pnc meningitis system	Y	www.ndsc.ie	N		
Italy	Y	www.simi.iss.it/meningite-batterica.htm	N		Same
Lithuania	N		N		
Malta	Y	www.slh.gov.mt/icunit/icuearee.asp	Y	Infection Control Newsletter	
Netherlands	N		Y	Annual reports	
Norway	Y	www.fhi.no/tema/smittvern/haandbok/pneumokokkinfeksjon.html	Y	MSIS - report	
Poland					
National ID surveillance	Y	www.pzh.gov.pl/epimed	Y	Kronika Epidemiologicza	
NRCBM	N		N		
Scotland	Y	www.show.scot.nhs.uk/scieh/	Y	HPS weekly report	www.ewr.hps.scot.nhs.uk/
Slovak Republic	N		Y	Bulletin of chief hygienist - annual report	
Slovenia	N		Y	Health Statistical Year Book	
Sweden	N	www.smittskyddsinstitutaet.se	Y	Communicable diseases in Sweden, annual report	Available on request
Switzerland	Y	www.bag.admin.ch/infreporting/mv/d/index	Y	BAG Bulletin (german) or Bulletin OFSP	www.bag.admin.ch/infreporting/bulletin/d/index.htm

Y: Yes N: No

- Laboratory surveillance practice, a vital component of IPD surveillance, also varied, particularly regarding provision of access to a central reference laboratory and to quality assurance. In a number of countries serotype information was missing, which is critical to ascertain coverage of the 7-valent conjugate vaccine in relation to the actual distribution of serotypes in the country. It is also required to monitor for serotype replacement post-PCV introduction. Several countries undertook surveillance for Pnc AMR, which is a potential emerging public health problem;
- In several instances, parallel surveillance systems for Pnc were operating in a single country, and the surveillance findings were apparently not integrated. This was raised by one country in relation to the surveillance of pneumococcal antimicrobial resistance, within the European Antimicrobial Resistance Surveillance System (EARSS) [15].
- Case-based data were available in almost all surveillance systems, with information usually collected on age, sex and clinical presentation. However, only a few countries routinely collected information on the vaccination status of cases. This is essential (together with population coverage) to estimate vaccine effectiveness (using the classical screening method);
- Most systems disseminated regular reports and aggregate data through websites and national epidemiological bulletins. However, in a small number of cases pneumococcal surveillance data was not disseminated.
- A large number of IPD cases were detected through these routine surveillance systems. However, as has been previously documented, there are large inter-country variations in reported IPD rates [3,16]. These large differences reflect a combination of true epidemiological differences and various patient and healthcare factors. The latter include antibiotic prescribing, blood culture practice, reporting practices and structural differences in surveillance system. Each of these components varies from country to country.

Recommendations

Pneumococcal surveillance is critical if countries are to be able to ascertain the pre-vaccination epidemiology and disease burden of Pnc and therefore make an informed decision on whether and how to introduce PCV. Pnc surveillance will also be important for monitoring and comparing the impact and effectiveness of the vaccine (including serotype replacement) after its introduction. This will be particularly important because countries will introduce a variety of schedules into their childhood immunisation programmes. Based on the results of this survey, a number of general recommendations can be made:

- The epidemiology of invasive pneumococcal disease remains poorly described in a number of European countries. In the present era of licensed conjugate and polysaccharide pneumococcal vaccines, there is a clear need for countries to improve national surveillance of IPD, including identification of serotype, in order both to ascertain local disease burden, and to monitor and compare the impact and effectiveness of various, new vaccination programmes as they are introduced;
- Standard case definitions for IPD and collection of minimum case data need to be established to ensure that any data collected is comparable across Europe. This should include standard clinical presentations (meningitis, septicaemia, pneumonia, etc.). The European Centre for Disease Prevention and Control (ECDC) is currently reviewing the case definitions in use across Europe with the aim of producing standard recommendations for use in Europe.
- Parallel surveillance systems for IPD, in particular Pnc antimicrobial susceptibility and serotype surveillance, need to be more integrated;
- All countries should have access to an identified central reference laboratory able to undertaken Pnc isolation and serotyping. Countries need to establish national surveillance systems based on these laboratory reports. The reference laboratory should undertake regular quality assurance and have access to external quality control.

*** The European Pneumococcal group included:**
R George (Health Protection Agency, London, England), S de Greeff (Rijksinstituut voor Volksgezondheid en Milieu, Bilthoven, the Netherlands), G Hanquet (Scientific Institute for Public Health, Brussels, Belgium), H Jaccard Ruedin (Swiss Federal Office of Public Health, Bern, Switzerland), L L Hogberg (Institute for Infectious Disease Control, Stockholm, Sweden), W Hryniewicz (National Institute of Public Health, Warsaw, Poland), M Staum Kaltoft (Statens Serum Institut, Copenhagen, Denmark), M Koliou (Archbishop Makarios Hospital, Nicosia, Cyprus), B Kriz (National Institute of Public Health, Prague, Czech Republic), N Kupreviciene (Centre for Communicable Disease Prevention and Control, Vilnius, Lithuania), K Kutsar (Health Protection Inspectorate, Tallinn, Estonia), T Leino (Kansanterveyslaitos,

TABLE 6

Pneumococcal disease surveillance in the European Union and available data (27 surveillance systems), 2006

Country / Name of surveillance system	Year of report	Total IPD cases	IPD incidence/ 100 000	Total Pnc meningitis cases	Pnc meningitis incidence/ 100 000	IPD case fatality ratio	Pnc meningitis case fatality ratio	% Pnc isolates pen non-susceptible
Belgium								
ID sentinel laboratory system	2002	1072	13.0	48	0.6			15
Pedisurv	###							
National Pnc reference laboratory	2003	1674	16.1	91	0.9			13
Czech Republic								
EPIDAT	2003			61	0.6		18.0	
National Streptococci Reference Lab	2003	270	2.7	75	0.7			2.0
Denmark								
National notification system				95	1.8	20		3
National laboratory surveillance	2002	1089	20.3					3
England & Wales	2004	6171	11.6	276	0.5			7
Finland	2002	612	11.8					0.9
France								
EPIBAC	2003	6324	10.6	589	1.0			
CNRP-ORP	2003				0.95			43
GPIP-ACTIV (meningitis)	2004			120 (<18 y)	1.4 (<18 y)		10.4 (<18 y)	50.4 (<18 y)
Germany	2002	465 (# 560)	3.5 (#CRA 4)	166 (CRA: 177)	1.2 (CRA: 1.3)	17	11	0.9
Ireland								
EARSS-Ireland	2002	278	7.1					11.5
Pnc meningitis system	2002			15	0.4		6.7	
Italy		235##	0.4	235	0.4		12.5	12.2
Lithuania		15	0.4					
Malta		12	3.4			8.3		0
Netherlands	2005	1296	7.9	246	1.5			0.9
Norway	2002	918	20.2			7.4		
Poland								
National ID surveillance	2005	175	0.46	110	0.29			
NRCBM	2004			49	0.13			18.2
Scotland	2005	719	14.2					0.6
Slovak Republic		17##	0.3	17	0.3	0	5.9	40
Slovenia		92	4.6			6.5		24.2
Sweden	2003	1152	12.9					
Switzerland		884	12.3			13		13
TOTAL		**23 470**		**2 193**				

 # CRA = capture-recapture estimate
Meningitis cases only
Data only available from 2006

Helsinki, Finland), A Lepoutre (Institut de veille sanitaire, Paris, France), O Lovoll (Institute of Public Health, Oslo, Norway), J McMenamin (Health Protection Scotland, Glasgow, Scotland), M Micallef (Department of Public Health, Malta), L Miller (Health Protection Agency, London, England), J Mossong (Laboratoire National de Sante, Luxembourg), H Nohynek (Kansanterveyslaitos, Helsinki, Finland), J O'Donnell (National Disease Surveillance Centre, Dublin, Ireland), M Paragi (Institute of Public Health, Ljubljana, Slovenia), J Perevoscikovs (State Public Health Agency, Riga, Latvia), A Perrocheau (Institut de veille sanitaire, Paris, France), S Salmaso (Istituto Superiore di Sanità, Rome, Italy), S Samuelsson (Statens Serum Institut, Copenhagen, Denmark), M Slacikova (National Public Health Institute, Bratislava, Slovak Republic), A Zielinski (National Institute of Public Health, Warsaw, Poland).

Acknowledgements

We gratefully acknowledge all the national gatekeepers who kindly completed and returned the questionnaire and commented on the draft document. Pnc-EURO was an EU funded project (Project number QLG4-CT-2000-00640).

References

1. Cartwright K. Pneumococcal disease in western Europe: burden of disease, antibiotic resistance and management. Eur J Pediatr. 2002;161(4):188-95.
2. Bruinsma N, Kristinsson KG, Bronzwaer S, Schrijnemakers P, Degener J, Tiemersma E et al. Trends of penicillin and erythromycin resistance among invasive Streptococcus pneumoniae in Europe. J Antimicrob.Chemother. 2004;54(6):1045-50.
3. Hausdorff WP, Siber G, Paradiso PR. Geographical differences in invasive pneumococcal disease rates and serotype frequency in young children. Lancet 2001;357(9260):950-2.
4. Pebody R, Leino T, Nohynek H, Hellenbrand W, Salmaso S, Ruutu P. Pneumococcal vaccination policy in Europe. Euro Surveill 2005;10(9):174-8. Available from: http://www.eurosurveillance.org/em/v10n09/1009-226.asp
5. Lexau CA, Lynfield R, Danila R, Pilishvili T, Facklam R, Farley MM et al. Changing epidemiology of invasive pneumococcal disease among older adults in the era of pediatric pneumococcal conjugate vaccine. JAMA. 2005;294(16):2043-51.
6. Centres for Disease Control and Prevention (CDC). Direct and indirect effects of routine vaccination of children with 7-valent pneumococcal conjugate vaccine on incidence of invasive pneumococcal disease---United States, 1998-2003. MMWR Morb Mortal Wkly Rep. 2005;54(36):893-7.
7. Huang SS, Platt R, Rifas-Shiman SL, Pelton SI, Goldmann D, Finkelstein JA. Post-PCV7 changes in colonizing pneumococcal serotypes in 16 Massachusetts communities, 2001 and 2004. Pediatrics. 2005;116(3):e408-e413.
8. Pai R, Moore MR, Pilishvili T, Gertz RE, Whitney CG, Beall B. Postvaccine genetic structure of Streptococcus pneumoniae serotype 19A from children in the United States. J Infect Dis. 2005;192(11):1988-95.
9. Reinert RR. Pneumococcal conjugate vaccines--a European perspective. Int J Med Microbiol. 2004;294(5):277-94.
10. MAR Bergsaker, B Feiring. Introduction of pneumococcal conjugate vaccine into the Norwegian childhood vaccination programme. Euro Surveill 2006;11(2):E060202.5. Available from: http://www.eurosurveillance.org/ew/2006/060202.asp#5
11. Conseil supérieur d'hygiène publique de France, section des maladies transmissibles. Avis du 19 mai 2006 relatif à la vaccination par le vaccin anti-pneumococcique conjugué chez les enfants de moins de deux ans et les enfants de deux à cinq ans. http://www.sante.gouv.fr/htm/dossiers/cshpf/a_mt_190506_pneumo_enf.pdf. 2006.
12. Robert Koch-Institut. Impfempfehlungen der Ständigen Impfkommission (STIKO) am Robert Koch-Institut / Stand: Juli 2006. Epidemiol Bull 2006;30 http://www.rki.de/cln_006/nn_767686/DE/Content/Infekt/EpidBull/Archiv/2006/30__06,templateId=raw,property=publicationFile.pdf/30_06
13. M van Oosten, SC de Greeff L Spanjaard LM Schouls. Introduction of pneumococcal conjugate vaccine into the Dutch national immunisation programme. Euro Surveill. 2006;11(6):E060608.2. Available from: http://www.eurosurveillance.org/ew/2006/060608.asp#2.
14. C Cameron, R Pebody. Introduction of pneumococcal conjugate vaccine to the UK childhood immunisation programme, and changes to the meningitis C and Hib schedules. Euro Surveill. 2006;11(3):E060302.4. Available from: http://www.eurosurveillance.org/ew/2006/060302.asp#4
15. EARSS Annual Report 2004, Available at http://www.rivm.nl/earss/result/Monitoring_reports/
16. Fedson DS,.Scott JA. The burden of pneumococcal disease among adults in developed and developing countries: what is and is not known. Vaccine. 1999;17 Suppl 1:S11-S18

ORIGINAL ARTICLES

Outbreak report

PROLONGED OUTBREAK OF B MENINGOCOCCAL DISEASE IN THE SEINE-MARITIME DEPARTMENT, FRANCE, JANUARY 2003 TO JUNE 2005

P Rouaud[1], A Perrocheau[2], MK Taha[3], C Sesboué[4], A Forgues[4], I Parent du Châtelet[2], D Levy-Bruhl[2]

Between January 2003 and June 2005, an outbreak of meningococcal disease occured in the department of Seine-Maritime in northern France. Eighty six cases were notified, giving an average annual incidence of 2.7 cases per 100 000 inhabitants, compared with 1.6 in France. An especially affected area was defined as the city of Dieppe and its surrounding area (26 cases, giving an annual incidence of 12 cases per 100 000). This outbreak was due to *N. meningitidis* phenotype B:14:P1.7,16 belonging to the clonal complex ST-32/ET-5. Over the 31 B14:P1.7,16 cases confirmed by phenotyping methods at the national reference centre for meningococci (CNR, Centre National de Référence des méningocoques) the case-fatality rate (19%) and the proportion of purpura fulminans (42%) were especially high. Teenagers aged between 15 and 19 years and children aged 1 to 9 years were the most affected. In 2003, health authorities put in place enhanced epidemiological surveillance and informed practitioners and population about the disease. In 2004, the national vaccination advisory board studied the opportunity of using a non licensed outer membrane vesicle vaccine developed in Norway which may be effective against the B14:P1.7,16 strain. The Ministry of health decided in 2006 to offer vaccination with this vaccine to people aged 1 to 19 years in Seine- Maritime.

Euro Surveill. 2006;11(7/8): 178-81 Published online July/August 2006
Key words: meningococcal disease, France, Seine-Maritime, B:14:P1.7,16 N. meningitidis, outbreak

1. Cellule inter régionale d'épidémiologie de Haute-Normandie, Rouen, France
2. Institut de veille sanitaire, Saint Maurice, France
3. Centre national de référence des méningocoques, Paris, France
4. Direction Départementale des Affaires Sanitaires et Sociales de Seine-Maritime, Rouen, France

Introduction

In France, invasive meningococcal disease (IMD) is a mandatory notifiable disease [1] and strains isolated from patients are sent to the national reference centre for meningococci (CNR, Centre National de Référence des méningocoques). The last evaluation of IMD surveillance estimated the exhaustivity of mandatory reporting at 80% [2,3]. The goal of the surveillance is rapid detection of clusters or abnormal situations