



Introduction

The following pertussis surveillance report aims to provide an overview of surveillance systems and selected epidemiological characteristics of pertussis at European level for 2009.

Methods

We requested data for pertussis, to be provided in a case-based format. If case-based data could not be supplied, we requested aggregated data, consisting of the number of cases in specified age-groups. Standardized forms were used to collect information on vaccination status, laboratory confirmation, hospitalisation and deaths. Data was collected retrospectively in 2010. The following report provides an overview of the variables available for aggregated datasets, and for the countries with epidemiological data obtained through mandatory notification systems covering national populations. Cases meeting the requirements for national surveillance, including clinical, laboratory-confirmed, and epidemiologically linked cases, were analyzed. Country and age-specific incidence were calculated using the population estimates from Eurostat.¹ Population estimates from 2008 were used for the UK because the 2009 population was not available.

For the countries reporting case-based data, an analysis of additional variables regarding case classification and type of laboratory diagnosis was also performed.

Surveillance systems and reporting

Of the 32 EUVAC.NET-participating countries, 28 conducted surveillance for pertussis based on a mandatory notification system covering the total population. Case-based data was provided by 14 countries, aggregated data by 13 countries; one country reported zero cases (Panel).

The mandatory surveillance system in Belgium only operated in one of its three regions, while in Germany pertussis was a notifiable disease in five of the 16 federal states. Switzerland and France had sentinel surveillance system for pertussis.

Panel. Countries reporting surveillance pertussis data to EUVAC.NET, by format of data reporting, 2009

Case-based (n=14)

Austria, Cyprus, Estonia, Finland, Greece, Ireland, Italy, Lithuania, Norway, Portugal, Romania, Slovakia, Slovenia and United Kingdom

Aggregated (n=13)

Bulgaria, Croatia, Czech Republic, Denmark, Hungary, Iceland, Luxemburg, Netherlands, Latvia, Poland, Spain, Sweden and Turkey

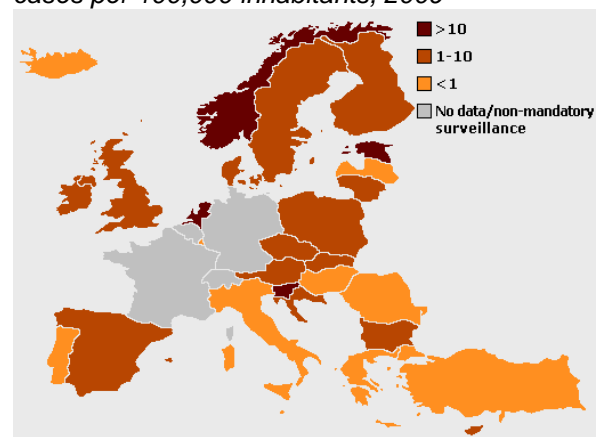
Malta reported zero cases.

Results

Number of cases and incidence

A total of 20,591 pertussis cases was reported from the 28 countries that provided epidemiological data based on mandatory notification systems covering total country population (Table 1). This corresponds to an overall incidence of 4.9 per 100,000 inhabitants. The incidence category of reported pertussis per 100,000 inhabitants is shown in figure 1. The highest incidences were reported from Norway and Estonia, with 114.3 and 46.9 cases per 100,000 inhabitants, respectively. Most cases (71%; n=14,302) were reported from the Netherlands (n=6,468) followed by Norway (n=5,487) and Poland (n=2,390), contributing to 31%, 27% and 11% respectively of all cases reported for 2009.

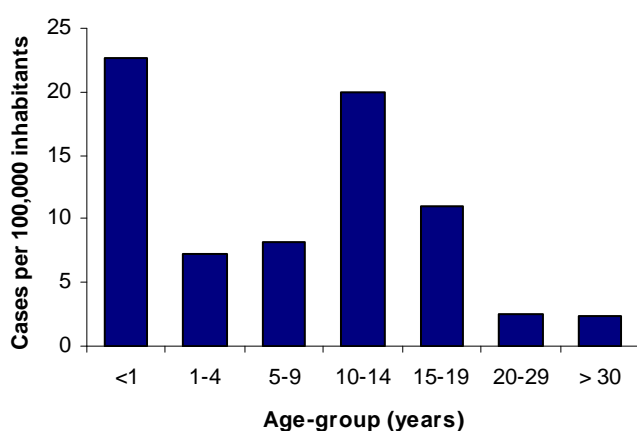
Figure 1. Incidence category of reported pertussis cases per 100,000 inhabitants, 2009



Age distribution

Data on the specified age-groups was known in 20,341 cases (99%). These were distributed between age-groups with 1,132 (6%) aged <1 year, 1,413 (7%) aged 1-4 years, 1,989 (10%) aged 5-9 years, 4,978 (25%) aged 10-14 years, 2,992 (15%) aged 15-19 years, 846 (4%) aged 20-24 years, 656 (3%) aged 25-29 years, and 6,335 (31%) older than 30 years. The incidence was highest among infants, (22 cases per 100,000) and among those aged 10-14 years (20 cases per 100,000 inhabitants), Figure 2.

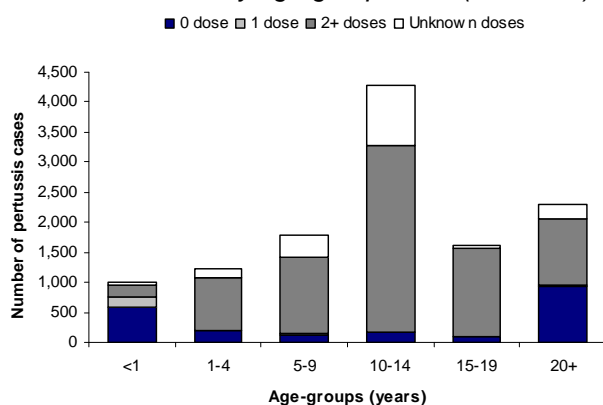
Figure 2. Incidence of reported pertussis cases by age-group, 2009



Vaccination status

The vaccination status was known in 12,223 (59%) of all reported pertussis cases (Table 2). Of these, 2,102 (17%) were unvaccinated, 247 (2%) were vaccinated with one dose, 7,986 (65%) were vaccinated with at least two doses, and 1,888 (15%) were vaccinated with an unspecified number of doses. Of those unvaccinated (n=2,102), 26% were infants (n=543) and 44% adults over 20 (n=930).

Figure 2. Number of pertussis cases with a known vaccination status by age-group, 2009 (n=12,220)



Three cases with unknown age-group not shown

Hospitalisation and mortality

Data with hospitalisation status was provided by 21 countries (Table 3). There were 1,951 reported hospitalised cases in connection with pertussis (104 per 1000 pertussis cases). The largest proportions of these were infants (29%) followed by those aged 10-14 years (22%).

Data on deaths was provided by 21 different countries (Table 3). Two deaths in infants were reported from Bulgaria; two other deaths were reported from UK in infants aged 6 and 7 weeks, and therefore younger than two months, when the first dose of the primary pertussis vaccination course is recommended.

Case-based notifications

Information at an individual level was available for 8,956 cases (43%), reported by 14 countries (Panel).

Case classification

Of these 8,956 cases, 7,932 (82%) were classified as confirmed, 772 (9%) as probable, 18 (2%) as possible. For 234 (3%) the case classification was unknown.

Laboratory diagnosis

Of the 7,932 laboratory confirmed cases, 160 were diagnosed with culture, 1,500 with PCR, and 5,947 with serology. Some cases were confirmed with more than one test. For 819 cases which were classified as confirmed, information on which test was used for laboratory confirmation was not available.

Comments

The burden of pertussis across Europe in 2009 remains unchanged to that of the previous year. In 2009 most countries remained in the same incidence category as in 2008. Infants still carried the major burden in terms of incidence and hospitalisations.

Comparisons between countries need to be interpreted with caution due to different reporting procedures and health systems, the case definitions in use, and the different extent of use of laboratory confirmation. Data on hospitalisations and deaths are also particularly influenced by the type of surveillance system in place, and this is reflected by a large variation in the estimates observed in the present analysis. Moreover, ascertainment of deaths due to pertussis is known to be poor.³

Only about half of the countries were able to report case-based data. The reasons for this could be various, not least the large amount of

cases of pertussis reported by some countries. Nevertheless, such a finding indicates a need to strengthen surveillance of pertussis at European level. Case-based data is needed to perform a more accurate assessment, and there is need to compare age-specific incidences in countries with different policies on vaccine booster doses.² Case-based data showed that the majority of cases were laboratory-confirmed, nevertheless information on the type of test used was missing for about 10% cases. An integration of laboratory surveillance with epidemiological surveillance will definitely strengthen the quality of data. To promote recommendations from European level, a complete set of variables in a case-based format is required.

The pooled data from 28 countries showed that infants were the most affected by pertussis. The deaths occurred only in infants, as well as most hospitalisations. A recent population based study from the Netherlands assessed that the source of infection of pertussis in infants are a siblings (41%), especially those aged 9-13 years, and mothers (38%).⁴ These findings are compatible with our assessment at European level, which indicates as adolescents aged 10-14 years as the second group with the highest incidence of pertussis.

References

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Reporters

Sabrina Bacci and Henrik Bang

Issued: 19 October 2010

Last updated: 21 January 2011

Contributors

We would like to thank all those who have contributed data and comments for this report:

Austria: Gabriela El Belazi, Bulgaria: Mira Kojouharova,; Croatia: Iva Pem Novosel and Bernard Kaic, Cyprus: Chrystalla Hadjianastassiou, Czech Republic, Katerina Fabianova and Bohumir Kriz, National Institute of Public Health; Denmark: Annette Hartvig Christiansen, Statens Serum Institut; Estonia: Natalia Kerbo, Health Board; Finland,

Qiushui He, National Institute for Health and Welfare; France: Isabelle Bonmarin, Institut de Veille Sanitaire; Greece: Danai Pervanidou, Hellenic Centre for Disease Control and Prevention; Hungary: Katalin Kaszás and Zsuzsanna Molnár, National Center for Epidemiology; Iceland: Thorolfur Gudnason, Directorate of Health; Ireland: Sarah Gee and Suzanne Cotter, Health Protection Surveillance Centre; Italy: ,Stefania Iannazzo, Ministry of Welfare; Latvia: Larisa Savrasova, Public Health Agency; Lithuania: Eglė Valikonienė, Centre for Communicable Diseases and AIDS; Luxembourg : Norbert Charlé and Pierre Weicherding, Direction de la Santé; Malta: Jackie Maistre Melillo, Health Division; the Netherlands: Sabine de Greeff, National Institute of Public Health and the Environment, Norway: Øistein Løvoll, National Institute of Public Health; Poland: Pawel Stefanoff and Iwona Pradowska, National Institute of Hygiene; Portugal: Delphine Sauvageot and Teresa Fernandes, Directorate General of Health; Romania, Adriana Pistol, Institute of Public Health; Slovakia: Helena Hudcová and Jan Mikas, Public Health Authority; Slovenia: Maja Praprotnik and Alenka Kraigher, Institute of Public Health; Spain: Isabel Peña-Rey Lorenzo and Josefa Masa, Instituto de Salud Carlos III; Switzerland, Jean-Luc Richard, Federal office of public health; Sweden: Tiia Lepp, Swedish Institute for Infectious Disease Control; Turkey: Umit Ozdemirer and Aslihan Coskun, Primary Health Care General Directorate; UK: Carina Crawford and Joanne White, Health Protection Agency.

Acknowledgments

I would like to thank Mark Muscat for his useful comments.

Table 1. Number, incidence, and proportion of laboratory-confirmed pertussis cases, 2009

	Number of cases (incidence per 100,000)				Laboratory-confirmed cases (%)	
	2008		2009		2009	
Austria	188	2.3	185	2.2	52	28%
Bulgaria	193	2.5	251	3.3	133	53%
Croatia	102	2.3	102	2.3	n/a	-
Cyprus	3	0.4	8	1.0	5	63%
Czech Republic	767	7.4	955	9.1	921	96%
Denmark	505	9.2	541	9.8	541	100%
Estonia	485	36.2	629	46.9	622	99%
Finland	511	9.6	267	5.0	267	100%
Greece	22	0.2	45	0.4	32	71%
Hungary	33	0.3	33	0.3	31	94%
Iceland	2	0.6	0	0.0	0	94%
Ireland	104	2.4	79	1.8	61	77%
Italy	336	0.6	437	0.7	71	16%
Latvia	13	0.6	8	0.4	1	13%
Lithuania	51	1.5	233	7.0	7	3%
Luxemburg	11	2.3	1	0.2	1	100%
Malta	1	0.2	0	0.0	0	-
Netherlands	8,246	50.3	6,468	39.2	6,468	100%
Norway	3,892	82.2	5,487	114.3	5,319	97%
Poland	2,164	5.7	2,390	6.3	n/a	-
Portugal	72	0.7	64	0.6	63	98%
Romania	50	0.2	9	0.0	9	100%
Slovakia	105	1.9	288	5.3	288	100%
Slovenia	181	8.9	442	21.7	352	80%
Spain	663	1.5	538	1.2	125	23%
Sweden	459	5.0	281	3.0	265	94%
Turkey	17	0.02	11	0.01	11	100%
UK	1,032	1.7	839	1.4	839	100%
Total	20,208	4.9	20,591	4.9	16,473	80%

Table 2. Pertussis cases by country and by vaccination status, 2009

	Unvaccinated		1 dose		≥ 2 doses		Unspecified number of doses		Unknown vaccination status	
	n	%	n	%	n	%	n	%	n	%
Austria	23	12%	6	3%	18	10%	1	1%	137	74%
Bulgaria	84	33%	24	10%	119	47%	0	0%	24	10%
Croatia	36	35%	2	2%	31	30%	9	9%	24	24%
Cyprus	2	25%	0	0%	5	63%	1	13%	0	0%
Czech Republic	112	12%	5	1%	800	84%	32	3%	6	1%
Denmark	57	11%	13	2%	21	4%	0	0%	450	83%
Estonia	75	12%	3	0%	362	58%	0	0%	189	30%
Finland	8	3%	2	1%	3	1%	0	0%	254	95%
Greece	9	20%	2	4%	17	38%	0	0%	17	38%
Hungary	8	24%	1	3%	24	73%	0	0%	0	0%
Iceland	0	-	0	-	0	-	0	-	0	-
Ireland	22	28%	6	8%	6	8%	7	9%	38	48%
Italy	175	40%	0	0%	0	0%	199	46%	63	14%
Latvia	4	50%	1	13%	2	25%	0	0%	1	13%
Lithuania	69	30%	9	4%	155	67%	0	0%	0	0%
Luxemburg	0	0%	0	0%	0	0%	1	100%	0	0%
Malta	0	-	0	-	0	-	0	-	0	-
Netherlands	582	9%	55	1%	3919	61%	183	3%	1729	27%
Norway	47	1%	0	0%	0	0%	1135	21%	4305	78%
Poland	302	13%	25	1%	1796	75%	0	0%	267	11%
Portugal	38	59%	14	22%	12	19%	0	0%	0	0%
Romania	1	11%	0	0%	8	89%	0	0%	0	0%
Slovakia	20	7%	0	0%	209	73%	0	0%	59	20%
Slovenia	27	6%	0	0%	154	35%	215	49%	46	10%
Spain	58	11%	31	6%	54	10%	31	6%	364	68%
Sweden	85	30%	17	6%	74	26%	9	3%	96	34%
Turkey	8	73%	2	18%	1	9%	0	0%	0	0%
UK	250	30%	29	3%	196	23%	65	8%	299	36%
Total	2,102	10%	247	1%	7,986	39%	1,888	9%	8,368	41%

Table 3. Pertussis-related hospitalisations, deaths and rates per 1,000 cases, 2009

	Hospitalised		Deaths	
	Number	Rate per 1000	Number	Rate per 1000
Austria	34	184	0	0
Bulgaria	n/a	-	2	8
Croatia	n/a	-	n/a	-
Cyprus	3	375	0	0
Czech Republic	56	59	0	0
Denmark*	60	-	0	0
Estonia	36	57	n/a	-
Finland	n/a	-	n/a	-
Greece	10	222	0	0
Hungary	15	455	0	0
Iceland	0	-	0	0
Ireland**	28	-	0	0
Italy	53	121	n/a	-
Latvia	4	500	0	0
Lithuania	n/a	-	0	0
Luxemburg	n/a	-	n/a	-
Malta	0	-	0	0
Netherlands	131	20	0	0
Norway	62	11	0	0
Poland	1079	451	0	0
Portugal	54	844	0	0
Romania	9	1000	0	0
Slovakia	18	63	0	0
Slovenia	124	281	0	0
Spain	n/a	-	n/a	-
Sweden***	27	-	0	0
Turkey	n/a	-	n/a	-
UK	148	176	2	2.4
Total	1,951	104[†]	4	0.2^{††}

n/a = not available

* For Denmark, the number of hospitalised cases and deaths is for those < 2 years old

** Ireland, hospitalisation rate was not calculated because the hospitalisation status was unknown for a number of cases

***Sweden, hospitalisation data is only available for children born since 1996 and for some children born 1992-1994 who have participated in pertussis vaccine trials.

† Hospitalisation rate is for the 20 countries with available data on hospitalisation for all age-groups and is based on total number of pertussis cases from these countries as denominator (n=18,839)

†† Death rate is for the 22 countries with available data on deaths on all age groups and is based on total number of pertussis cases from these countries as denominator (n=18,617)

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