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## MENINGITIS AND ENCEPHALITIS IN POLAND IN 2011

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### ABSTRACT

**INTRODUCTION.** About 2 000-3 000 cases of meningitis and/or encephalitis of viral or bacterial etiology are recorded every year in Poland.

**AIM OF THE STUDY.** The aim of this study was to assess the epidemiology of meningitis and/or encephalitis in Poland in 2011 and compare it to the situation in previous years.

**MATERIALS AND METHODS.** Assessment of the epidemiological situation of meningitis and/or encephalitis in Poland in 2011, was based on the results of analysis of epidemiological interviews sent to the NIZP-PZH by the Regional Sanitary-Epidemiological Stations published in the annual bulletin "Infectious diseases and poisonings in Poland in 2011" and "Preventive immunizations in Poland in 2011" (Czarkowski MP. et al., Warsaw, NIZP-PZH, GIS).

**RESULTS.** In 2011 in Poland it was recorded 2 915 cases of meningitis and/or encephalitis. This included 1 438 cases of viral etiology, 888 of bacterial etiology and 589 of other etiology specified or unspecified. Among the reported cases of bacterial meningitis and/or encephalitis dominant etiological factor was *N. meningitidis* (193), *S. pneumoniae* (192) and *H. influenzae* type B (11). Among the infections of viral etiology predominated was virus of tick-borne encephalitis (221).

**SUMMARY AND CONCLUSIONS.** The epidemiological situation of inflammatory meningitis - meningitis and / or brain in Poland in 2011 compared to 2010 did not change significantly.

**Keywords:** *meningitis, encephalitis, epidemiology, Poland, 2011*

### INTRODUCTION

About 2 000-3 000 cases of meningitis and/or encephalitis is annually registered in Poland. Among the confirmed cases of bacterial meningitis dominant etiological factor is *Neisseria meningitidis*, *Streptococcus pneumoniae*, and *Haemophilus influenzae* type B, and among cases of viral etiology dominant is viral encephalitis transmitted by ticks.

### THE AIM OF THE STUDY

The aim of this study was to assess the epidemiology of meningitis and/or encephalitis in Poland in 2011 and compare it to the situation in previous years.

### MATERIALS AND METHODS

Assessment of the epidemiological situation of meningitis and/or encephalitis in Poland in 2011, was based on analysis of epidemiological interviews sent to the NIH by the Regional Sanitary-Epidemiological Stations published in the annual bulletin "Infectious diseases and poisonings in Poland in 2011" and in the bulletin "Preventive Vaccinations in Poland in 2011" (Czarkowski MP et al., Warsaw, NIZP-PZH and GIS). Definitions of cases used in surveillance were based on the document "Definitions of cases of communicable diseases developed for epidemiological surveillance used in the years 2009-2011" (Department of Epidemiology, NIZP-PZH) and the data from the "Immunization Program for the year 2011" (Annex to the Statement of the Chief Sanitary Inspector from Oct. 28 2010).

## RESULTS

In 2011 in Poland it was recorded 2 915 cases of meningitis and/or encephalitis. This included 1 438 (49.3%) cases of viral etiology, 888 (30.5%) of bacterial etiology and 589 (20.2%) of other etiology specified or unspecified (Table I).

Detailed analysis and evaluation of the epidemiological situation of different etiological types of meningitis and/or encephalitis is discussed below.

### MENINGITIS AND ENCEPHALITIS OF BACTERIAL ETIOLOGY

In 2011 in Poland there were recorded 888 cases of meningitis and/or encephalitis (5.5% more than in 2010). Incidence 2.3/ 100 thousand was higher than in 2010 (2.21/100,000). The highest incidence was recorded in Podkarpackie (3.2/100,000), the lowest in the Lodzkie province (1.62/100,000). (Table II).

In 2011, as in 2010, the incidence among men (2.9 /100,000) was higher than the incidence among women (1.75/100,000). Incidence in rural areas (2.26/100,000) was lower than the urban population (2.33/100,000). (Table III).

The highest incidence was recorded in children under 4 years of age (9.82/100,000), but compared to 2010 it is a decrease of 9.7%. High incidence was also recorded in children in the age group 5-9 years (2.82/100,000). The lowest incidence was recorded among adults in the age group 25-44 years (1.28/100,000). (Table IV).

Out of 888 cases of bacterial meningitis etiologic agent was determined in 396 (44.6%) cases.

***Neisseria meningitidis***. In 2011, number of recorded cases of this etiology was. Compared to 2010 (146 cases) it is an increase of 32.2%. Registered number of cases in 2011 was similar to the median for the years 2005-2009 (Table I). The highest incidence was observed in the Warninsko-Mazurskie province

(0.89/100,000). The lowest was in the Opolskie province (0.10/100,000) (Table II).

*N. meningitidis* was dominant etiology in children and adolescents up to 19 years of age. In this age group 134 cases were registered ie 69.4% of all meningitis cases, with highest incidence in children up to 4 years of age (69 cases, 35.8% of the total) (Table IV). Most of the cases of meningococcal meningitis and/or encephalitis occurred in winter and early spring, mostly in March – 25, the least in July - 8.

Serological group of *N. meningitidis* was identified in 154 out of 193 registered cases (79.8%) (Table V). The most frequently isolated serogroup was B, responsible for 89 (46.1%) cases, serogroup C was the cause of 62 cases (32.1% of the total).

The analysis of epidemiological data indicate a noticeable increase of infections caused by *N. meningitidis* serogroup C since 2002. It is an important information from a public health perspective, because meningococcal infections of group C are the etiological factor in outbreaks and epidemics (Table V). In Poland, there are two types of vaccines against *N. meningitidis* containing serotypes A, C, Y and W135: 1) polysaccharide recommended for children over 2 years of age and adults and 2) conjugated for and children from 2 months of age. According to the Immunization Program in 2011, vaccination against *N. meningitidis* was mandatory in the case of an emergency or epidemic outbreaks and individual indications. In 2011, against *N. meningitidis* were vaccinated 71 981 people. It was 41.3% more than in 2010 (50 930 vaccinated). Vaccinated were mainly children and young people up to 19 years of age (67 473 persons, i.e. 93.7% of the total).

***Haemophilus influenzae* type B**. In 2011, as in 2010, it was recorded 11 cases of meningitis and / or encephalitis caused by *H. influenzae* type B, significantly less than the median for the years 2005 to 2009 (35 cases) (Table I). Registered cases occurred in 6 provinces. The highest incidence was recorded in the Zachodnio-

Table I. Meningitis and encephalitis in Poland in 2005-2011 by etiological agent. Number of cases and incidence per 100,000 population

Etiological agent	Median 2005-2009		Meningitis and encephalitis			
	number of cases	incidence rate	2010		2011	
			number of cases	incidence rate	number of cases	incidence rate
<i>Neisseria meningitidis</i>	190	0.39	146	0.38	193	0.50
<i>Haemophilus influenzae</i>	35	0.10	11	0.03	11	0.03
<i>Streptococcus pneumoniae</i>	151	0.31	180	0.47	192	0.50
bacterial specified	161	0.42	148	0.39	139	0.36
bacterial unspecified	467	1.34	361	0.95	353	0.92
viral specified	362	0.81	371	0.98	284	0.74
viral unspecified	1215	3.181	1248	3.26	1154	3.01
meningitis and encephalitis: specified and unspecified	408	0.98	598	1.57	589	1.53
Total	2806	7.53	3063	8.03	2915	7.59

Table II. Meningitis and encephalitis in Poland in 2011. Number of cases and incidence per 100,000 population by etiological agent and province

Province	Bacterial meningitis and encephalitis										Viral meningitis and encephalitis						meningitis and encephalitis: specified and unspecified	
	<i>Neisseria meningitidis</i>		<i>Haemophilus influenzae</i>		<i>Streptococcus pneumoniae</i>		specified and unspecified		Total		specified and unspecified		tick-borne encephalitis		number of cases	incidence rate		
	number of cases	incidence rate	number of cases	incidence rate	number of cases	incidence rate	number of cases	incidence rate	number of cases	incidence rate	number of cases	incidence rate	number of cases	incidence rate				
POLAND	193	0.5	11	0.03	192	0.5	492	1.28	888	2.30	1217	3.16	221	0.57	589	1.53		
1. Dolnoslaskie	19	0.65	3	0.1	17	0.58	21	0.72	60	2.06	61	2.09	13	0.45	31	1.06		
2. Kujawsko-pomorskie	14	0.67	-	-	13	0.62	26	1.24	53	2.53	82	3.91	-	-	10	0.48		
3. Lubelskie	15	0.69	-	-	4	0.18	30	1.38	49	2.25	39	1.79	6	0.28	23	1.06		
4. Lubuskie	6	0.59	-	-	5	0.49	15	1.47	26	2.54	13	1.27	-	-	6	0.59		
5. Lodzkie	4	0.16	-	-	7	0.28	30	1.18	41	1.62	41	1.62	3	0.12	20	0.79		
6. Malopolskie	8	0.24	-	-	11	0.33	36	1.08	55	1.65	129	3.86	6	0.18	77	2.30		
7. Mazowieckie	36	0.68	2	0.04	23	0.44	43	0.82	104	1.97	155	2.94	25	0.47	59	1.12		
8. Opolskie	1	0.1	-	-	3	0.3	27	2.66	31	3.05	83	8.17	4	0.39	27	2.66		
9. Podkarpackie	7	0.33	1	0.05	14	0.66	46	2.16	68	3.20	182	8.55	3	0.14	69	3.24		
10. Podlaskie	2	0.17	-	-	7	0.58	23	1.91	32	2.66	32	2.67	89	7.4	45	3.74		
11. Pomorskie	19	0.83	-	-	17	0.75	28	1.23	64	2.81	75	3.29	-	-	18	0.79		
12. Slaskie	16	0.35	2	0.04	32	0.69	71	1.53	121	2.61	61	1.32	5	0.11	87	1.88		
13. Swietokrzyskie	8	0.62	1	0.08	1	0.08	25	1.95	35	2.73	36	2.81	8	0.62	20	1.56		
14. Warminsko-mazurskie	13	0.89	-	-	12	0.83	12	0.83	37	2.55	42	2.89	56	3.85	14	0.96		
15. Wielkopolskie	19	0.55	-	-	16	0.46	38	1.1	73	2.12	119	3.45	-	-	57	1.65		
16. Zachodniopomorskie	6	0.35	2	0.12	10	0.58	21	1.22	39	2.26	67	3.89	3	0.17	26	1.51		

Table III. Meningitis and encephalitis in Poland in 2010-2011. Incidence per 100,000 population by gender and surroundings

Type of diagnosis	Year	Total	gender		surroundings	
			male	female	town	village
Bacterial meningitis and encephalitis	2010	2.21	2.78	1.69	2.09	2.40
	2011	2.30	2.90	1.75	2,33	2.26
Viral meningitis and encephalitis	2010	3.47	4.13	2.85	3.55	3.33
	2011	3.16	2.95	3.35	3.16	3.16
Viral encephalitis: Tick-borne	2010	0.77	1.01	0.55	0.61	1.02
	2011	0.57	0.73	0.43	0.41	0.82

pomorskie province (0.12/100,000) (Table II). Cases occurred mainly in children under 4 years of age (27.3% of the total number of cases, incidence 0.16/100,000). Vaccination against *H. influenzae* type B had been introduced as a obligatory vaccination in 2007. According to the National Vaccination Program in 2011 full vaccination course includes doses at 2, 4 and 6 months of age (primary vaccination) and one booster dose given at 2 years of age. In 2011 there were 15 321 people vaccinated against *H. influenzae* type B, mostly children aged 0-4 years - 12 345 (80.5% of vaccinees). The number of

people vaccinated against *H. influenzae* type B remains high. In 2011, the vaccination status of children under 2 years of age in whole country exceeded 97.2%.

***Streptococcus pneumoniae***. In 2011, it was recorded 192 cases of meningitis and /or encephalitis caused by *S. pneumoniae*, 6.7% more than in 2010 (Table I). As in the previous year, people over age 25 accounted for the majority of cases (74.0%). Cases in the age group 0-4 years amounted to 16.2% (1.5/100,000) (Table IV). Meningitis and/or encephalitis caused by *S. pneumoniae*

Table IV. Meningitis and encephalitis in Poland in 2011. Number of cases and incidence per 100,000 population by etiology and age group

Etiological agent	Age group								Total	
	0-4	5-9	10-14	15-19	20-24	25-44	45-64	65 i >		
<i>Neisseria meningitidis</i>	69	15	11	39	13	21	20	5	193	
<i>Haemophilus influenzae</i>	3	0	0	0	1	3	2	2	11	
<i>Streptococcus pneumoniae</i>	31	6	4	3	6	39	78	25	192	
Bacterial meningitis and encephalitis: specified and unspecified	100	30	27	26	24	85	128	72	492	
Bacterial meningitis and encephalitis (total)	number of cases	203	51	42	68	44	148	228	104	888
	incidence rate	9.82	2.82	2.15	2.87	1.56	1.28	2.14	1.98	2.30
Viral meningitis and encephalitis: specified and unspecified	45	119	119	142	129	411	181	71	1217	
Viral encephalitis: Tick-borne	0	4	2	17	22	51	100	25	221	

Table V. Serotypes of *Neisseria meningitidis* in 1994-2011 in Poland

Year	<i>Neisseria meningitidis</i>		confirmed serotypes [%]	Serotypes of <i>Neisseria meningitidis</i>					
	number of cases	number of identified serotypes		A	B	C	D	other	mixed
1994	163	37	22.7	5	24 (65%)	8 (22%)	-	-	-
1995	151	49	32.5	2	38 (78%)	8 (16%)	1	-	-
1996	144	43	29.9	3	30 70%	10 (23%)	-	-	-
1997	140	51	36.4	-	40 (78%)	9 (18%)	-	2	-
1998	129	54	41.9	-	47 (87%)	5 (9%)	-	2	-
1999	121	47	38.8	1	40 (85%)	5 (11%)	-	1	-
2000	110	39	35.5	-	32 (82%)	7 (18%)	-	-	-
2001	100	25	25.0	2	16 (64%)	7 (28%)	-	-	-
2002	90	22	24.4	2	13 (59%)	7 (32%)	-	-	-
2003	76	39	51.3	3	20 (51%)	14 (36%)	-	2	-
2004	119	69	58.0	6	41 (59%)	19 (27%)	-	3	-
2005	135	77	57.0	2	37 (48%)	35 (45%)	-	3	-
2006	148	83	56.1	2	35 (42%)	41 (49%)	-	5	-
2007	224	170	76.0	1	77 (46%)	80 (48%)	-	6	6
2008	220	186	85.0	1	87 (46%)	89 (47%)	-	1	8
2009	190	164	86.3	2	79 (48%)	74 (45%)	-	4	5
2010	146	129	88.4	-	67 (52%)	56 (43%)	-	5	1
2011	193	154	79.8	-	89 (46%)	62 (32%)	-	3	-



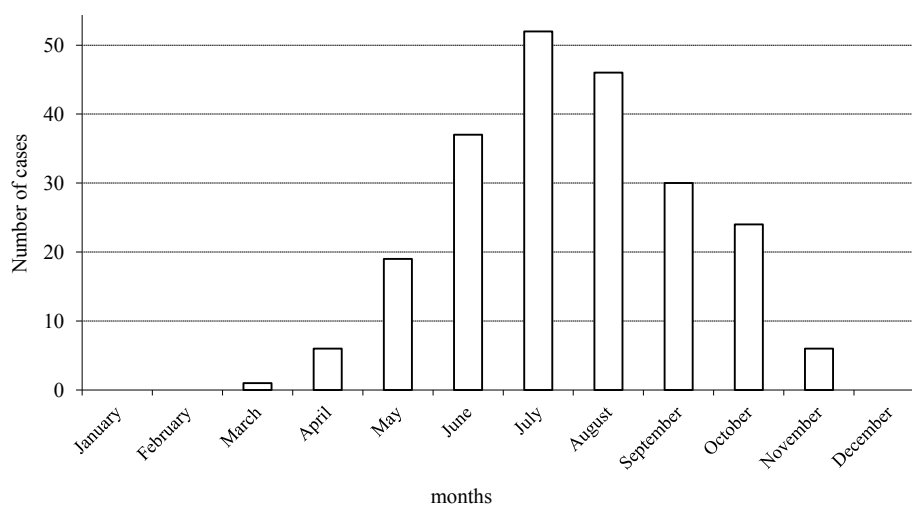
Fig. 1. Tick-borne encephalitis, Poland, 1991-2011. Incidence per 100,000 population

occurred in all provinces, with the highest incidence recorded in the Warminsko-Mazurskie (0.83 per 100 thousand.), the lowest in Świętokrzyskie - 0.08/100 thousand. (Table II.) According to the National Immunization Program in 2011, vaccination against *S. pneumoniae* was mandatory only for children within high-risk groups with specific medical indications. However, it was recommended for people over 65 years of age, children over 2 years of age and adults at risk. In 2011, in Poland 176 648 people were vaccinated against *S. pneumoniae* as compared to 2010 (155 258 vaccinated) it was an increase of 13.8%. Predominated among those vaccinated were children under 14 years of age - 159 199 (90.1%).

#### MENINGITIS AND ENCEPHALITIS OF VIRAL ETIOLOGY

In 2011 there was a decrease in the number of viral neuroinfections by 12.5% compared to 2010 (Table I). Total number of registered cases was 1 438 (incidence 3.73/100,000), of which 15.4% were encephalitis transmitted by ticks (221 cases).

The highest incidence of viral neuroinfections was reported in Podlaskie (10.1/100,000 (Table II). The incidence in rural areas (3.99/100,000) was higher than the urban population (3.57/100,000). (Table III). In 2011 there were 422 recorded cases of viral encephalitis (1.1/100,000). Among them, as in previous years, the largest percentage (52.3%) were cases of tick-borne encephalitis (0.57/100,000).



Source: Questionnaires of cases sent to NIPH-NIH by the Voivodeship Sanitary and Epidemiological Stations  
Fig. 2. Seasonal distribution of tick-borne encephalitis in Poland in 2011

**Tick-borne encephalitis (TBE).** In 2011, there were 221 recorded cases of encephalitis transmitted by ticks - the incidence was 0.57/100,000 i.e. 15.4% of cases of viral etiology. In comparison to the previous year it was a decrease of 73 cases (25.0%). In the last decade, the highest incidence was recorded in 2009 (0.92/100,000). (Fig. 1). Distribution of cases of TBE in the country in 2011, followed a similar pattern as in previous years. The highest number of cases - 89, and the highest incidence was observed in the Podlaskie province (7.4/100,000) (Table II). In Kujawsko-Pomorskie, Lubuskie and Pomorskie there were no recorded cases of TBE. The age of patients was in the range of 4 to 91 years (median, 47 years). Just as in 2010, the highest incidence was observed in the age groups 25-44 (23.1%) and 45-64 (45.2%) (Table IV.) More cases occurred in men (136, 61.5%) and in rural areas (125, 56.6%) (Table III.).

Of the 221 reported cases, tick prick was reported in 125 (56.1%). Cases were the most frequent in pensioners (17.6%), the unemployed (16.7%), farmers and forestry workers (12.7%). Seasonality was typical for TBE, i.e. the period of occurrence from March to November, with the highest number of cases registered from June to October (Fig. 2)

According to the Immunization Program in 2011, vaccination against TBE is recommended to people living in or traveling to endemic areas and professional groups of increased risk of infection. Vaccination

scheme includes an inactivated vaccine in the series 0-3-12 months and booster doses every 3-5 years.

Status of vaccination against TBE in Poland remains low. Since 2009, there was a decrease in the number of people vaccinated. In 2011, number of people vaccinated was 32 561, i.e. by 31.0% less compared to 2010. The highest number of people vaccinated was in Mazowieckie - 8 919, the smallest in Świętokrzyskie - 442 people.

## SUMMARY AND CONCLUSIONS

In comparison to the previous year, the epidemiological situation of meningitis and/or encephalitis in Poland in 2011, has not changed. Problem remains with low vaccine coverage. Especially, given the severity of invasive pneumococcal disease, the introduction of vaccination against pneumococcal disease for all children is urgently needed.

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