Trends in tick-borne diseases surveillance in bordering regions of Poland and Czech Republic, 1999-2005

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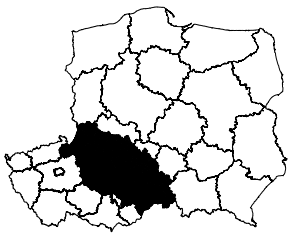
Background

- Lyme borreliosis (LB) is the most common vector-borne disease in Central Europe and has been reported from all regions in Czech Republic and Poland since the start of reporting in middle of 1990's.
- Tick-borne encephalitis (TBE), a relatively rare and focally distributed disease, has been endemic in regions on the border of Czech Republic and Poland for over 50 years.
- Zoonotic diseases are expected to have comparable distributions in bordering regions of the two countries, where no natural barriers exist.
- Although historically communicable disease surveillance systems in Poland and Czech Republic were organised similarly, they differ significantly in terms of diagnostic protocols, clinical habits and level of epidemiological training.
- Understanding the differences in performance of surveillance systems can help interpret surveillance data at the international level.
- The aim of the present study was to compare the information output in both countries and assess the surveillance systems performance in bordering regions of Czech Republic and Poland.

Material and Methods

- The study area comprised arbitrarily selected neighbouring regions of Czech Republic and Poland (Fig. 1).

Figure 1. Map and description of the studied region



	Poland	Czech
District characteristics		
Number	51	24
Mean population (1999-2005)	117 926	140 904
Total study area (km2)	26 496	23 160
Total population	6 014 220	3 096 060
Population density	227.0	133.6
Proportion of population living in towns		
Towns < 1 000	14.1%	16.9%
Towns 1000 - 10000	18.8%	34.3%
Towns 10000 - 50000	19.3%	26.5%
Towns 50000 - 100000	9.4%	18.3%
Towns 100000 - 200000	19.2%	3.3%
Towns > 200000	19.2%	0
Surveillance characteristics		
Number of Heath Departments	36	24
Number of physicians per 10000 inhabitants	26.9	35.8

- TBE and LB case reports from years 1999-2005 were used for this study. The diagnostic certainty was ascertained based on TBE and LB case definitions used in Poland (Table 1). The criteria for LB confirmation are based on the EUCALB case definitions (meduni09.edis.at/eucalb/index.htm).

Table 1. Case definitions used in the study

TICK-BORNE ENCEPHALITIS	LYME BORRELIOSIS
Possible case: Clinically compatible case, AND onset of illness during a period of increased tick activity (between April and November) Probable case: Clinically compatible case, AND increased probability of infection during previous 6 weeks (living in or visit to endemic area), AND demonstration of specific IgM antibodies in serum, with no history of vaccination against any flaviviral disease during previous 3 months Confirmed case: Clinically compatible case, AND demonstration of intrathecal synthesis of specific IgM or IgG antibodies, OR positive virus isolation from tissues, blood, or cerebro-spinal fluid, OR demonstration of specific IgM and IgG antibodies in serum, with no history of vaccination against any flaviviral disease during previous 3 months	Erythema (chronicum) migrans: Expanding red or bluish-red patch, often with central clearing. No need of laboratory confirmation. Early neuroborreliosis: Painful meningo-radiculoneuritis with or without facial palsy or other cranial neuritis, AND evidence of intrathecally produced specific antibodies. Lyme carditis: Acute onset of atrio-ventricular (II-III) conduction disturbances, rhythm disturbances, sometimes myocarditis or pancarditis, AND significant change in levels of specific IgG antibodies. Lyme arthritis: Recurrent brief attacks of objective joint swelling in one, or a few, large joints, occasionally progressing to chronic arthritis, AND presence of specific IgG antibodies. Acrodermatitis chronica atrophicans: Long-standing red or bluish-red lesions, usually on the extensor surfaces of extremities, eventuall becoming atrophic, AND presence of specific IgG antibodies.

- A logistic model was fitted to examine independent factors associated with certainty of diagnosis. The variables considered were sex, age, country of residence (Poland or Czech Republic), hospitalisation, exposure status (case remembered exposure or not), and occupation (forester or other). The final models for LB were fitted separately for all cases and for non-Erythema Migrans (EM) cases.

Results

- In Czech Republic 8,211 cases of LB (incidence ranging from 23.79 in 1999 to 40.57 in 2005) and 664 cases of TBE (incidence from 2.29 in 1999 to 3.97 in 2005) were recorded.
- In Poland 2,599 cases of LB (incidence from 0.91 per 100,000 in 1999 to 10.81 in 2005) and 81 cases of TBE (incidence from 0.11 per 100,000 in 1999 to 0.30 in 2005) were recorded.

Table 2. Distribution of selected demographic, diagnostic and clinical characteristics of tick-borne disease cases in bordering regions of Poland and Czech Republic in 1999-2005.

A. Lyme borreliosis

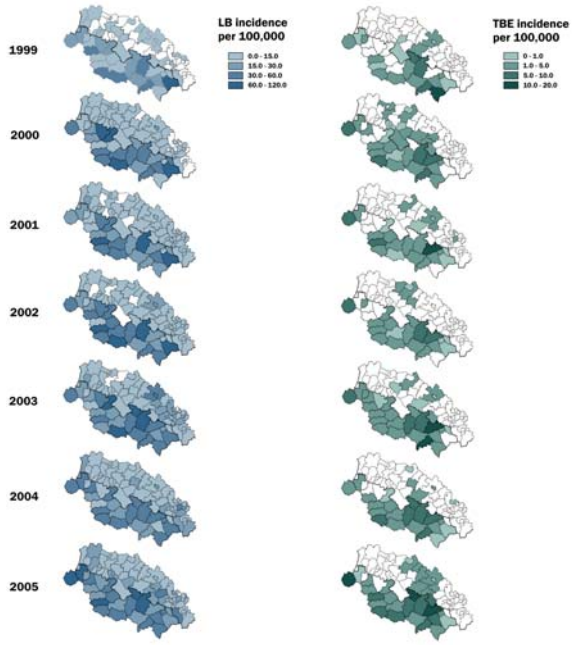
Selected variables	Poland (n=2,599)		Czech (n=8,211)	
	N	%	N	%
Occupation				
Forestry work	169	6.5	51	0.6
Farmer	11	0.4	37	0.5
Housewife	92	3.5	194	2.4
Office work	92	3.5	394	4.8
Student	239	9.2	1308	15.9
Retired	487	18.7	2067	25.2
Other	320	12.3	2876	35.0
Unemployed	152	5.8	946	11.5
Report of tick bite	1501	57.8	4220	51.4
Case classification				
Erythema migrans	1875	72.1	5912	72.0
Early neuroborreliosis	32	1.2	598	7.3
Lyme carditis	48	1.8	24	0.3
Lyme arthritis	230	8.8	502	6.1
ACA	11	0.4	11	0.1
Hospitalisation	1329	51.1	1299	15.8

B. Tick-borne encephalitis

Selected variables	Poland (n=81)		Czech (n=664)	
	N	%	N	%
Occupation				
Forestry work	4	4.9	15	2.3
Farmer	2	2.5	3	0.5
Housewife	3	3.7	7	1.1
Office work	7	8.6	27	4.1
Student	17	21.0	132	19.9
Retired	12	14.8	100	15.1
Other	28	34.6	333	50.2
Unemployed	8	9.9	36	5.4
Exposure route				
Tick bite	43	53.1	444	66.9
Milk	0	0.0	30	4.5
Unknown	38	46.9	190	28.6
Case classification				
Possible case	2	2.5	50	7.5
Probable case	51	63.0	395	59.5
Confirmed case	28	34.6	219	33.0
Hospitalisation	81	100.0	644	97.0

- Geographic distribution of TBE and LB incidence is presented on Fig. 2.

Figure 2. Map of districts describing geographic distribution of LD and TBE incidence in bordering regions of Poland and Czech Republic in 1999-2005



- In Czech Republic, compared to Poland, a higher proportion of LB confirmed cases was reported (in 2002 OR 5.88, 95% CI 4.16 – 7.69).
- The diagnostic certainty of LB decreased in Czech Republic by 5% per year, and in Poland increased by 20% per year. When excluding the EM cases, hospitalisation was associated with more frequent confirmation of cases, in contrast to the history of tick bite.
- In the reported LB cases, but not if the EM cases were excluded, foresters were less commonly confirmed. It could be explained by the fact that they were more likely to be diagnosed with systemic disease.
- Cases of LB, but not TBE, who remembered a tick bite or who were hospitalised were more likely to be diagnosed with high certainty. Also unlike for TBE, the percentage of confirmed LB cases decreased both in Poland (OR 0.75, 95% CI 0.65-0.86 per year) and in Czech Republic (OR 0.88, 95% CI 0.81-0.95 per year).

Conclusions

- There are important differences in performance of surveillance systems in Czech Republic and Poland.
- Spatial distribution of tick-borne diseases in the studied region indicate that the communicable disease surveillance in the Czech Republic is more sensitive in detecting tick-borne disease cases.
- The specificity of both systems was comparable. A higher proportion of LB cases from Czech Republic met the case definition criteria. It indicates the need to improve diagnostic protocols for systemic LB in Poland.
- High percent of hospitalised LB cases in Poland and higher percent of confirmed cases among hospitalized cases suggest that the surveillance needs to be enhanced in the primary health care settings.

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