Case fatality of meningococcal meningitis in Poland in 1999- 2006

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Background

- Invasive meningococcal disease is often associated with long term complications such as neurological deficits, or occasionally with fatal outcome.
- In industrialized countries case fatality normally does not exceed 5% to 15%, but can reach 50% in Africa.
- The right timing of antibiotic administration, age, serogroup were demonstrated to have impact on the probability of survival.
- The aim of the study was to estimate meningococcal meningitis case fatality in Poland and factors associated with worse prognosis.

Material and Methods

- Data from routine clinician-based surveillance of meningococcal meningitis in 1999 to 2006 were used.
- Notification of meningococcal meningitis in Poland is mandatory. Cases are notified by clinicians to local epidemiologists who carry out epidemiological investigation and record relevant information on standardized forms. These forms are then forwarded to the National Institute of Hygiene. Laboratory results are based on the hospital laboratory investigations.
- Cases were retrospectively classified according to the European case definition (see below). We analyzed 873 cases meeting case definition criteria for probable or confirmed case out of 910 cases reported in 1999 to 2006.
- Chi-square test and logistic regression were used to analyze factors potentially associated with CFR.

Case classification used in Poland

Clinical description
Clinical picture compatible with meningococcal disease, e.g. meningitis and/or meningococcemia that may progress rapidly to purpura fulminans, shock and death. Other manifestations are possible.

Laboratory criteria for diagnosis
Isolation of *Neisseria meningitidis* from a normally sterile site (e.g. blood or cerebrospinal fluid (CSF) or, less commonly, joint, pleural or pericardial fluid)
Detection of *N. meningitidis* nucleic acid from normally sterile site
Demonstration of gram-negative diplococci from normally sterile site by microscopy
For probable case:
Single high titre of meningococcal antibody in convalescent serum.

Case classification
Possible: N.A.
Probable: A clinical picture compatible with invasive meningococcal disease without any laboratory confirmation, or with *N. meningitidis* identification from a non-sterile site, or with high levels of meningococcal antibody in convalescent serum.
Confirmed: A clinically compatible case that is laboratory confirmed

Note that asymptomatic carriers should not be reported.

Results

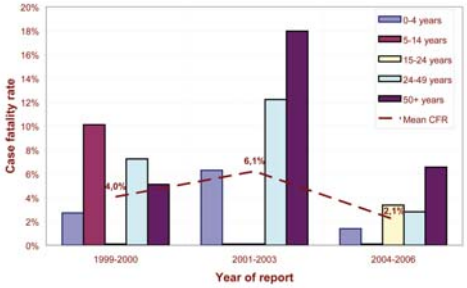
Table 1. Patient characteristics

Sex:	Male	506 (58.0%)
	Female	367 (42.0%)
Age:	0 - 4 years	383 (43.9%)
	5 – 9 years	66 (7.6%)
	10 – 14 years	63 (7.2%)
	15 – 19 years	136 (15.6%)
	20 – 24 years	48 (5.5%)
	24 – 49 years	98 (11.2%)
	>=50 years	79 (9.1%)
Clinical manifestation:	Meningitis	567 (65.0%)
	Meningitis with septicaemia	245 (28.1%)
	Meningitis with symptoms of encephalitis	61 (7.0%)
Serogroup*	B	237 (59.1%)
	Non-B	164 (40.9%)

*available for 45.9% of cases

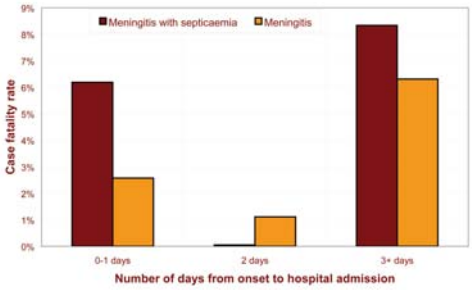
- Overall case fatality rate (CFR) was 3.8% (33/873), but it ranged from 2.1% in 2004-2006 to 6.1% in 2001-2003.
- CFR was the lowest in the age groups 15-19 and 5-9 (1.5%) and the highest in the age group 50+ (10.1%) (p=0.0160). Case fatality increased in adolescents and young adults aged 15 – 24 in the years 2004-2006 (Fig. 1).

Fig. 1. Meningococcal meningitis case fatality by age group and year of report



- Symptoms classified by clinicians as encephalitis were associated with higher CFR (13.1%) then meningitis with septicemia (5.7%) or meningitis only (1.9%) (p<0.0001).
- CFR was slightly higher for cases caused by serogroup B (4.2%) then by other serogroups (1.8%) (p=0.1864).
- CFR was the highest among persons hospitalized 3 or more days after onset (6.7%) as compared to persons admitted within 1 day (3.6%) or 2 days after onset (0.9%) (p=0.0496) (Fig. 2).

Fig. 2. Menigococcal meningitis case fatality by time from onset to hospital admission and clinical manifestation



- Higher CFR was also associated with underlying conditions that may lead to or indicate lower immunity (15.9% vs 3.1%, p<0.0001). These conditions included: premature birth, neoplasm, splenectomy, alcoholism, cahexia and diabetes or herpes zoster, CMV infection.
- Adjusting for clinical diagnosis and depressed immunity state prognosis was still worse for persons with delayed hospital admission (Table 2).

Table 1. Multivariate risk factors associated with higher probability of fatal outcome.

	Odds Ratio	95% confidence interval	Wald p-value
Presence of septicaemia	2.7	1.2 - 5.8	0.0139
Time from onset to hospital admission:			
Within 1 day vs 2 days	4.7	0.6 - 35.8	0.4261
3 or more days vs 2 days	8.6	1.0 - 71.3	0.0299
Year of report:			
2001 - 2003 vs 2004 - 2006	3.9	1.5 - 10.2	0.0315
1999 - 2000 vs 2004 - 2006	3.0	1.1 - 8.6	0.3143
Presence of immunosupression	6.5	2.5 - 16.8	0.0001

Conclusions

- Meningococcal meningitis CFR is comparable to CFR reported elsewhere and, as noted in other studies, is higher among adults an elderly.
- CFR was significantly higher in 2001-2003, when circulation of virulent complex was described by the National Reference Centre for Bacterial Meningitis in Warsaw. However, in 2004 – 2006 IMD received increased public interest and extensive media coverage. This could contribute both to earlier care-seeking for symptoms compatible with IMD and to more complete reporting, decreasing the observed CFR.
- Persons admitted to hospital almost immediately after onset are likely to be the ones experiencing more rapid progression, which would explain higher CFR in the group. In case of persons admitted a few days of onset. earlier admission to hospital might help reduce meningococcal meningitis mortality.