BURDEN OF DISEASE AND SOCIETAL COSTS DUE TO MENINGOCOCCAL DISEASE IN DENMARK – A NATIONAL REGISTER BASED STUDY

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Background

Despite being preventable by vaccine, meningococcal disease (MD) remains a substantial global public health burden. Incidence rates of MD are highest in children, adolescents and young adults. The incidence has decreased in the past decades, although still being severe to the affected cases each year. In Europe 1.1 MD case per 100,000 (2004) and 0.7 MD case per 100,000 in Denmark (2015) were affected.

However, detailed information on the burden and the associated societal costs of MD - especially in Europe - is limited. **The objective was therefore to estimate the societal costs of meningococcal disease (MD) and the burden of disease in Denmark.**

Methods

The study was designed as a retrospective study based on national Danish registries covering all Danes. Incident patients with a primary diagnosis of MD (ICD-8 code 036 (from 1980 to 1993) or ICD-10 code A39 (from 1994 to 2015)) were identified in the National Patient Register and matched with two controls using direct matching on age, gender and level of education. Siblings constituted a secondary control population (Figure 1).

With a societal perspective, costs related to healthcare services in hospitals and primary care, prescription medicine, municipality homecare services, and lost production were included. All costs were inflated to 2015 prices and converted to US\$ (USD 1= DKK 6.73).

Average actual costs were defined as average costs per person in a given year before/after MD diagnosis. Future costs due to MD were simulated with projections from 2017 to 2060. Burden of disease was assessed by analyses on mortality, sequelae a posteriori and follow-up on labour market status.

Figure 1. Primary and secondary study populations

Conflict of interest

This study was supported by Pfizer Denmark. Incentive was a paid vendor of Pfizer Denmark. Sandra Elkjær Stallknecht and Nina Gustafsson are employees at Incentive. Lars Jørgen Østergaard was a paid clinical consultant of Pfizer Denmark. Peter Bo Poulsen and Mette Skovdal are employees at Pfizer Denmark.

Results

Patients diagnosed with MD have more sequelae, lower employment rates in the first year after diagnosis, and the mortality is significantly affected in the period immediate after the diagnosis. Actual health care costs are high (Table 1). The differences in costs between cases and controls are most significant in the baseline year (case: \$3,834; control: \$1,742) and the first year after diagnosis (case: \$16,641; control: \$1,426). Most plausibly the increased costs in the baseline year is explained by more prior comorbidities among cases compared to controls. Similar results were found with sibling controls.

Table 1. Average actual costs per patient in the baseline year (year 0) and the first five years after MD diagnosis among patients diagnosed in 1997-2015, and their matched controls/siblings (US\$ 2015 prices)

	Year 0		Year 1		Year 2		Year 3		Year 4		Year 5	
	Case	Control	Case	Control	Case	Control	Case	Control	Case	Control	Case	Control
Primary study population												
N	2,165	4,330	2,165	4,330	1,913	3,826	1,828	3,656	1,768	3,536	1,743	3,486
Primary sector costs	329	260	350	249	268	217	246	214	214	212	214	196
Outpatient costs	503	267	1,096	249	470	263	387	229	348	238	333	259
Hospital admission costs	2,591	864	14,817	659	1,090	536	824	568	598	493	549	413
Medicine costs	221	172	197	159	185	146	174	148	157	136	149	133
Home care costs	190	179	182	110	91	86	40	26	16	2	41	2
Grand total	3,834	1,742	16,641	1,426	2,105	1,247	1,672	1,185	1,334	1,082	1,286	1,004
Secondary study population												
N	894	894	894	894	799	799	766	766	742	742	732	732
Primary sector costs	268	212	288	199	221	190	198	189	192	188	192	186
Outpatient costs	371	174	979	153	413	150	307	163	365	175	320	162
Hospital admission costs	1,608	549	13,225	330	756	332	569	256	454	253	308	210
Medicine costs	110	81	115	95	113	96	113	102	112	93	108	96
Home care costs	0	0	3	0	0	0	0	0	0	0	0	0
Grand total	2,357	1,016	14,610	777	1,504	768	1,186	709	1,124	709	928	654

As the Danish population grow in coming decades, the future costs of MD are estimated to increase. Based on the study data, a conservative estimate projects annual costs up to US\$ 1.5-1.7 million in the period 2017-2060. A less conservative and higher estimate, incl. losses due to premature death, projects annual costs between US\$ 4.1-4.6 million.

Conclusions

- The societal costs and burden of meningococcal disease are substantial with hospital admission costs and production loss as main cost drivers.
- Costs are highest from the age of 14 and onwards.
- It could be reasonable that any kind of preventive activity were to target this or other age-groups using this evidence on the impact of the disease.