CLINICAL AND ECONOMIC BURDEN OF INVASIVE MENINGOCOCCAL DISEASE IN GERMANY

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BACKGROUND

- Invasive meningococcal disease (IMD) is an unpredictable and life threatening disease.
- IMD is associated with substantial morbidity and mortality with rates of ~10%, and ~ 20% of survivors are affected by permanent complications ¹.
- Although IMD is part of the infectious disease surveillance in Germany, limited data is available on detailed clinical characteristics, long-term outcomes, health care resource utilization (HRU) or the attributable costs of IMD.

OBJECTIVES

To examine short and long-term clinical characteristics of IMD patients, HRU and related costs in Germany.

METHODS

Data source: InGef (Institute for Applied Health Research Berlin) database which includes longitudinal inpatient and outpatient claims data of statutory health insurance providers in Germany².

Study design: A retrospective cohort study based on claims data

Inclusion criteria: First hospitalization with IMD (ICD-10 GM code A39) as main discharge diagnosis between 2009 and 2015 (admission date=index date) (Figure 1). And continuous enrollment of at least one year or from birth onwards (average follow up=48.5 months (SD=28.7 months))

Figure 1 Schematic illustration of the IMD cohort

Statistical analysis method:

- Descriptive analyses were conducted. For HRU and costs: IMD cohort was matched by age and sex with a non-IMD cohort (1:4 matching). All IMD cases (N=18; 11%) and matched controls (N=99; 15%) with extremely high cost in baseline were excluded. Mann-Whitney U-test was used to test the difference of costs between IMD cases and matched controls

LIMITATIONS

- Due to the low number of IMD cases, the statistical power was low.
- Costs obtained for this study only include direct medical costs from the perspective of German SHIs, but no indirect costs.
- IMD by serogroups were not distinguished

RESULTS

Figure 2: Age/sex and baseline risk condition, and the distribution of type of IMD (N= 164 IMD patients)

Figure 3: Clinical Outcomes of IMD Cases

CLINICAL OUTCOMES	IMD Cases (N=164)/Mean (SD)	% (95% CI) /Median (Q1, Q3)
Length of hospital stay (Day)	13.1 (11.3)	11.0 (8;15)
Mortality ^a		
Within 30-day	7	4.3% (1.7%-8.6%)
Within 1-year	9	5.5 % (2.5%-10.2%)
IMD complication at hospital discharge ^b	21	12.8%
IMD complication during the study period	24	14.6%
Adrenal hemorrhage	19	11.6%
Anoxic brain damage	N <5 ^d	
Stroke	6	3.7%
Sequelae occurred during the study period	35	23.5%
(# of patients excluded ^c)		
Limb ataxia, paresis, and paralysis	9	5.5%
Cranial nerve palsy (1)	N <5	
Learning disabilities and mental	N <5	
Blindness	N <5	
Obstructive hydrocephalus	N <5	
Hearing loss (5)	9	5.7%
Skin necrosis and/or skin grafting (1)	6	3.7%
Limb amputation	N <5	
Chronic renal failure (3)	12	7.5%
Epilepsy and seizures (3)	11	6.8%

^aProportion of patients who died within 30 or 365 days after the 1st diagnosis of IMD relative to the total number of patients in the IMD cohort with at least one year of follow-up or until death. 95% CI was calculated based on binomial distribution.
^bInclude adrenal hemorrhage, anoxic brain damage, stroke.
^cPatients with a prior diagnosis of a sequelae in the baseline period were excluded.
^dFor the privacy purpose, if N<5 only, exact number is not reported.

Figure 4: Mean overall actual costs within pre-defined time periods

- The index hospitalization related to IMD was associated with substantial high costs of 7,097€ (SD 10,370€).
- Patients with sepsis only or sepsis plus meningitis costed significantly more than patients with meningitis and other IMD

RESULTS (Cont.)

Figure 5: Comparison of overall actual mean costs of IMD cohort and matched Non-IMD cohort within pre-defined time periods

	IMD MATCHED	MATCHED NON-IMD	SMD ^a	P-VALUE ^b
Baseline (N)	146	557		
Mean (SD)	€ 644 (€815)	€ 718 (€995)	0.08	0.982
Within 1 month	146	557		
Mean (SD)	€ 2,277 (€19,462)	€ 50 (€162)	0.25	< 0.001
1 month to 1 year	138	553		
Mean (SD)	€ 1,954 (€5,830)	€ 885 (€2,372)	0.32	< 0.001
1 year to 3 years	130	520		
Mean (SD)	€ 2,791 (€7,474)	€ 1,767 (€3,547)	0.22	0.700
3 years to 5 years	96	390		
Mean (SD)	€ 1,834 (€3,833)	€ 1,436 (€2,906)	0.13	0.426
5 years to 7 years	56	208		
Mean (SD)	€ 2,523 (€6,195)	€ 1,682 (€4,194)	0.18	0.298

^a SMD=Standardized mean difference

^b Resulted from Mann-Whitnev U-test

Figure 6: Comparison of mean costs of HRU between IMD and non-IMD

CONCLUSIONS

- This study highlighted the cost, especially cost during the first month of IMD and underlines the importance of preventive measures against IMD such as vaccinations.
- Further studies with larger sample sizes of IMD cases are required to estimate the long-term effects of IMD with larger statistical precision.

REFERENCES

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² Andersohn F, Walker J. Characteristics and external validity of the German Health Risk Institute (HRI) Database. Pharmacoepidemiol Drug Saf. 2016 Jan;25(1):106–9.