MM 19P

Secondary cases of meningococcal disease may be prevented by the immediate identification and eradication of the disease-causing strain of Neisseria meningitidis in close contacts

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Abstract

- Meningococcal Project Telemark (MPT) was initiated in 1987 to prevent secondary cases of meningococcal disease by identification and eradication of the disease causing strain in close contacts.
- During the period 1987–2007, a total of 66 primary cases of meningococcal disease were bacteriologically verified in the county of Telemark (165.000 inhab.).
- No secondary cases occurred during the same period.
- The mean annual incidence of notified cases fell significantly from the period 1988–1997 to 1998–2007. No significant decline was seen in the neighbouring county of Vestfold (220.000 inhab.).
- The disease-causing strain was seen more often in household members and kissing contacts than in other contacts.

Objectives

- To evaluate the effect Meningococcal Project of Telemark (Project) to prevent secondary cases of meningococcal disease and,
- To summarise epidemiological and bacterial data on patients and close contacts.

Methods

The Meningococcal Project of Telemark.
The basic interventions in the Project were to:

- Ensure a rapid verification of invasive meningococcal disease (microbiologist).
- Identify close contacts of the patient (microbiologist and local physician).
- Collect throat samples from close contacts followed by direct plating and immediate incubation. (microbiologist).
- Identify meningococcal isolates from close contacts that are identical to the disease-causing strain using PCR amplicon restriction endonuclease analysis of the chromosomal folP gene (PCR AREA, refr 1) and/or DNA fingerprinting (ref. 2, microbiologist).
- Eradicate the disease-causing strain from close contacts (rifampicin) followed by bacterial control 7–10 days later (local physician and microbiologist).
- Arrange information meetings for the affected population in conjunction with throat sampling.

Epidemiological and statistical analyses.

- clinical, epidemiological and bacterial data on patients and on close contacts, respectively, were registered in two databases (dbase 3+).
- for creation of graphical presentations and further statistical analyses, the data were exported into Microsoft Excel and SPSS.

Results

- During the period November 1987–November 2007 a total of 66 primary cases with bacteriological verified meningococcal disease in the county of Telemark were detected.
- No secondary case occurred during the study period. Could this be due to our interventions?
- Three different estimates for the prevalence of secondary cases were used for statistical consideration; 2 % (USA, ref. 3), 10 % (all Norway, ref 4) and 30 % (Telemark 1984–87, prior to the Project, ref. 5). Using these three figures, the expected numbers of secondary cases were calculated to be 1.3, 7.3, and 28.3, respectively. Hence, the expected total number of cases would be 67,3, 74,3 and 94,3, respectively.
  Only for a prevalence of secondary cases at 30 % did we obtain a statistical significant difference between the observed number of cases (66) and the expected total number of cases (94,3).
- Does the eradication intervention reduce the prevalence of the disease-causing strains in the population of Telemark to such an extent that also the incidence of primary cases is reduced? The mean annual incidence of notified meningococcal disease in the first 10-years period (1988–1997) with that of the second period (1998–2007, data obtained from National Inst of Public Health, Oslo) for Telemark and the county of Vestfold. Figure 1 shows that there was a significant decline in incidence for Telemark from the period 1988–1997 to 1998–2007. No significant decline was seen in Vestfold. However, our analyses do not prove that this difference is due to our interventions. Other explanations for a greater fall in incidence in Telemark may be plausible.
- Figure 2 shows that during the last 10-years period the annual incidence of meningococcal disease has constantly been lower in Telemark than in Vestfold and all Norway.
- The disease-causing strain was found in 70 (3,1 %) out of a total of 2252 contacts.
- The prevalence of the disease-causing strain was highest (16,9 %) in household members and kissing contacts than in all other groups combined (1,8 %). The odds ratio for carrying the disease-causing strain in household-members and kissing contacts was 8, 7.

Contact group	Relation to the patient	Frequency	Percent	Identical	Identical %	Different	Different %
1	Fathers	49	2,2	6	12,2	3	6,1
2	Mothers	51	2,3	6	11,8	3	5,9
3	Sisters	37	1,6	3	8,1	1	2,7
4	Brothers	39	1,7	7	17,9	3	7,7
5	Kissing contacts	10	0,4	4	40,0	0	0,0
6	Others	24	1,1	2	8,3	6	25,0
	Sum household members	**210**	**9,3**	**28**	**13,3**	**16**	**7,6**
7	Grandparents	56	2,5	4	7,1	6	10,7
8	Playmates family	116	5,2	2	1,7	20	17,2
9	Playmates	286	12,7	6	2,1	48	16,8
10	Nursery employees	114	5,1	2	1,8	4	3,5
11	Childminders	6	0,3	1	16,7	1	16,7
12	Other family	214	9,5	5	2,3	37	17,3
13	Classmates	342	15,2	5	1,5	48	14,0
14	Children at nursery	421	18,7	2	0,5	11	2,6
15	Teachers	65	2,9	0	0,0	3	4,6
16	Colleagues	3	0,1	0	0,0	2	66,7
17	Others	294	13,1	7	2,4	25	8,5
	Sum other primary contacts	**1917**	**85,1**	**34**	**1,8**	**205**	**10,7**
	Total close contacts	**2127**	**94,4**	**62**	**2,9**	**221**	**10,4**
18	Secondary contacts	86	3,8	5	5,8	9	10,5
19	Tertiary contacts	16	0,7	3	18,8	2	12,5
20	Quartary contacts	19	0,8	0	0,0	0	0,0
	Sum	**2248**	**99,8**	**70**	**3,1**	**232**	**10,3**
	Missing	4	0,2				
	Total	**2252**	**100**	**70**	**3,1**	**232**	**10,3**

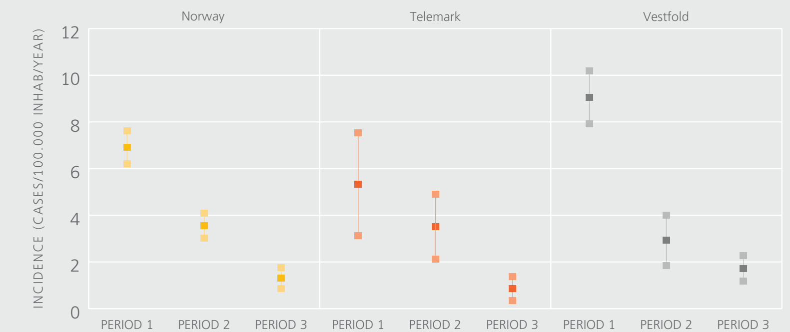

Figure 1. The mean annual incidence of notified cases of meningococcal disease in three 10-years periods in all Norway and in the counties of Telemark and Vestfold. The time periods are shown along the X-axis; period 1: 1978-1987, (prior to the Project), period 2: 1988-1997, and period 3: 1998-2007. The three figures along each vertical bar represents the mean, and the upper and lower confidence interval limits, respectively

Incidence meningococcal disease Norway, Vestfold and Telemark 1978–2007

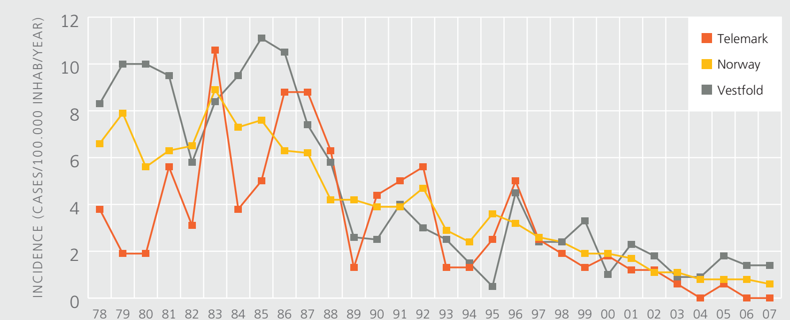

Figure 2.

Conclusions

- Secondary cases of meningococcal disease may be prevented by the rapid identification of the disease-causing strain in close contacts followed by subsequent eradication with rifampicin.
- Interventions included in the Meningococcal Project of Telemark may over time also reduce the total incidence of meningococcal disease in a population
- Household – members and kissing contacts have the highest risk of carrying the disease-causing strain.

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