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The reach of a hepatitis B vaccination programme among men who have sex with men

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Background: Homosexual contact is a major risk factor for acute hepatitis B infection. This study explores how many and which men who have sex with men (MSM) are reached by the ongoing hepatitis B vaccination programme in The Netherlands (started in 2002), and investigate reasons for non-participation and non-compliance. **Methods:** In this cross-sectional study, on the basis of ethnographic mapping and targeted sampling, 320 MSM were interviewed at different venues in three regions in The Netherlands. **Results:** Of the sample, 74% reported to be aware of the opportunity to obtain free hepatitis B vaccination, and 50% reported to be vaccinated (received at least one injection). Compliance with the three-dose vaccination schedule was 84%. The most important reason for non-participation in the vaccination programme was a low perceived risk of getting infected with the virus. A personal approach by STD-prevention workers, the recruitment region and having sex with casual partners were positively associated with vaccination uptake. Being bisexual was negatively associated with, and visiting gay bars/discos was positively associated with, awareness of the opportunity to obtain free hepatitis B vaccination. **Conclusion:** This study shows a large proportion of MSM is aware that they could opt for free hepatitis B vaccination. Future vaccination programmes should focus on a personal approach, since the use of STD prevention workers was shown to be a successful tool for participation in the vaccination programme. The personal information should focus on perceived risk of infection, since this was a major reason for vaccine refusal.

Keywords: Hepatitis B vaccination, men who have sex with men, vaccination programme

Introduction

Homosexual contact is a major risk factor for acute hepatitis B infection.[1,2] To enlarge the immunity against hepatitis B among men who have sex with men (MSM) a nationwide vaccination programme was started in The Netherlands in 2002.[3] The vaccination programme was coordinated by The Netherlands Association for Public Health Services and was implemented by local Public Health Services. In order to reach MSM, the Public Health Services have periodically visited various venues where MSM meet, i.e. cruising areas, gay bars, discos, parties and saunas. This method of collecting participants for vaccination is referred to as 'enhanced outreach'. Distributing posters and flyers at these locations to inform MSM about the free hepatitis B vaccination was also part of the programme.[3]

Within the Dutch vaccination programme, the hepatitis B vaccination was offered free of charge according to the 6-month schedule: i.e. at 0, 1 and 6 months. Participants were tested for markers of current or past infection with the hepatitis B virus when receiving their first dose of the vaccination. When found to be chronically infected (positive for anti-HBc and HBsAg), participants were referred to their health-care provider. Participants who were susceptible for hepatitis B were urged to get their second and third dose in order to comply with the hepatitis B vaccination schedule to obtain long-lasting protection (at least 15–20 years, probably life long). For those who had obtained natural immunity (anti-HBc positive, HBsAg negative), no further vaccination is required.[3]

In order to establish an optimal vaccination programme this study explores how many and which MSM: (i) are aware that they can opt for free hepatitis B vaccination, (ii) have been vaccinated within the programme and (iii) complied with the hepatitis B vaccination schedule. Also investigated are reasons for non-participation in the vaccination programme, and non-compliance with the hepatitis B vaccination schedule.

Methods

Between August 2004 and May 2006, 320 MSM were recruited for interviews in three intervention regions in The Netherlands: Rotterdam, Utrecht and South Limburg (the sample size was based on $N \geq 100$ per region). Our recruitment procedure was based on ethnographic mapping and targeted sampling.[4] Following this method, for each of the study regions, interviews with key persons (e.g. local authorities, people from within the gay community and health professionals) were held to map all geographic locations where MSM gathered (venues). These venues include cruising areas, gay bars, discos, parties, saunas, cinemas and sport associations. After the initial ethnographic map was made, repeated

observations took place at different hours at all the locations. The number, frequency and socio-demographic features of MSM visiting these locations were estimated. After gathering sufficient information about the sub-groups at each location, the number of MSM to be recruited per location was determined.

Based on the ethnographic map of each region, MSM were recruited by the interviewers at the recruitment locations at several moments and at different hours. As part of the informed consent-related procedure, MSM were given information about the nature of the questions to be expected, the amount of time the interview would take, and the fact that the study was based on anonymity. They were informed that they had the possibility not to answer any question if they chose not to. Interviews took about 30 min to complete. After completing the interview, respondents were given an incentive (a CD holder) for their participation.

In the present study, MSM are defined as men who have sex with men and men who want to have sex with men (the latter are included for preventive purposes: i.e. young men who do not yet have sex but want to have sex with men are assumed to be at risk for infection with the hepatitis B virus in the future (in practice this was only 1% of our sample). In total, 320 MSM took part in the study (response rate: 68%). No significant differences were found between those who did and those who did not participate regarding their age and ethnicity. The most important reason given for non-participation was not being in the mood to be interviewed. The interviews were performed using a semi-structured questionnaire.[5,6]

Associations between socio-demographics, sexual behaviour and visited locations with awareness of the possibility to obtain free hepatitis B vaccination, vaccination uptake and compliance were analysed using univariate statistics (chi-square test, Student's *t*-test and Mann–Whitney U-tests). Multivariate logistic regression analyses were performed with variables that showed a *P*-value <0.10 on a univariate level. Awareness of the possibility to obtain free hepatitis B vaccination, vaccination uptake and compliance with the vaccination schedule were included as the dependent variables in separate regression analyses. Because differences may exist in the intensity and the duration of the vaccination programme between the three regions, each region was controlled for in the analyses. A *P*-value <0.05 was considered statistically significant.

Results

Sample characteristics

Table 1 shows the socio-demographic characteristics of the study sample, for the total group and for those who were aware of the vaccination programme compared with those who were not. Mean age of MSM taking part in the study was 35.5 years (SD 11.8).

Table 2 shows that 8–10% of our sample can be categorized as bisexual MSM. During intercourse with regular partners consistent condom use was low: of MSM who had receptive intercourse with male regular partners in the past 6 months ($n = 247$), only 27% had always used a condom and 56% never had (data not shown). During insertive intercourse with their regular partner in the past 6 months ($n = 233$) condom use is comparably low: 33% had always used a condom, but 47% had never used a condom (data not shown). Condom use during sex with casual partners in the past 6 months was highest during insertive intercourse (81%), but rare during receptive oral sex (6%) (table 2).

Table 1 Proportions and mean scores (SD) for socio-demographic factors for the total sample, and those aware/unaware of the possibility to obtain free hepatitis B vaccination

Characteristics	Total *n* (%)	Aware %	Unaware %	*P*-value
Region				
Rotterdam	103 (32)	70	30	0.27
Utrecht	108 (34)	79	21	
South Limburg	109 (34)	74	26	
Living situation				
Alone	154 (48)	76	24	0.45
Not alone	166 (52)	72	28	
Main activity				
Working	235 (74)	74	26	0.8
Not working	84 (26)	75	25	
Religious				
Yes	129 (40)	73	27	0.69
No	191 (60)	75	25	
Educational level				
Low	38 (12)	66	34	0.23
Medium and high	280 (88)	75	25	
Ethnicity				
Dutch	256 (80)	74	26	0.85
Other	63 (20)	73	27	

Table 3 shows the venues MSM had visited during the past 6 months, i.e. gay bars/discos and cruising areas. For example, 75% of our sample had visited gay bars in the past 6 months, and 74% had visited gay sites on the Internet.

Awareness of the possibility to obtain free hepatitis B vaccination

Our results show that most MSM (74.1%) were aware that they could opt for free hepatitis B vaccination. Most MSM learned about this via flyers (32%), followed by STD prevention workers of the Public Health Services (30%), friends (23%), posters (19%), an advertisement in a magazine (18%) and via an Internet site (10%) (data not shown).

Results showing differences between MSM who were aware of the possibility to obtain free hepatitis B vaccination and those who were not are shown in tables 1–3. In addition, mean age of MSM who were aware of the free hepatitis B vaccine was lower as compared with those who were unaware [34.5 years (SD 12.6) vs. 38.4 years (SD 12.6), $P = 0.009$]. Table 4 shows that 'visiting gay bars and discos' and 'sexual attraction' were the most important predictors of awareness of the opportunity to obtain free hepatitis B vaccination in a multivariate model.

Hepatitis B vaccination uptake

In our sample, the prevalence of self-reported hepatitis B was 8.2%. Of the total sample of MSM (including those who are unaware of the vaccination campaign and those who have been infected with the virus, $n = 320$), the self-reported vaccination rate against the hepatitis B virus was 50%, 3% did not know if they were vaccinated against hepatitis A or B and 47% reported not to be vaccinated against hepatitis B (data not shown). The vaccination rate includes one or more vaccinations against hepatitis B (and thus differs from the immunization rate).

Of MSM who had obtained vaccination ($n = 159$), more than half (55%) reported to be vaccinated as part of the free hepatitis B vaccination programme. Within this programme, the majority of MSM (74%) received their first injection at the Public Health Service, 8% at an STD clinic and 18% at an outreach location, e.g. a gay sauna. Of those who had not

Table 2 Proportions for sexual risk behaviour factors for the total sample and those aware/unaware of the possibility to obtain free hepatitis B vaccination

Characteristics	Proportions/mean (SD)			
	Total *n* (%)	Aware %	Unaware %	*P*-value
Sexual attraction				
Only to men/more to men	293/320 (92)	77	23	0.0001
Both to men and women/more to women	27/320 (8)	44	56	
Sexual identity				
Gay, more gay than straight	277/309 (90)	78	22	0.0001
Bisexual, more straight than gay	32/309 (10)	47	53	
Regular male sex partner (current)				
Yes	135 (42)	77	23	0.29
No	184 (58)	72	28	
Casual sex partner(s) past 6 months				
Yes	213 (67)	75	25	0.54
No	107 (33)	72	28	
Receptive intercourse with casual sex partners past 6 months				
Yes	71 (33)	86	14	0.01
No	142 (67)	70	30	
Condom use past 6 months				
Always	50 (70)	91	9	–
Inconsistent/never	21 (30)	84	16	
Insertive intercourse with casual sex partners past 6 months				
Yes	103 (48)	78	22	0.4
No	110 (52)	73	27	
Condom use past 6 months				
Always	84 (81)	80	20	–
Inconsistent/never	20 (19)	76	24	
Receptive oral sex with casual sex partners past 6 months				
Yes	168 (79)	78	22	0.06
No	45 (21)	64	26	
Condom use past 6 months				
Always	10 (6)	78	22	–
Inconsistent/never	157 (94)	80	20	
Sex with women past 6 months				
Yes	30 (10)	53	47	0.01
No	284 (90)	76	24	
STD lifetime prevalence				
Yes	154 (49)	77	23	0.24
No	165 (52)	71	29	

Of the variables measuring condom use, no χ^2 could be calculated as the conditions of this test could not be fulfilled (>20% of the cells has an expected count <5)
STD, sexually transmitted diseases

Table 3 Proportions of venues that have been visited in the past 6 months for the total sample, and those aware/unaware of the possibility to obtain free hepatitis B vaccination

Characteristics	Total *n* (%)	Aware %	Unaware %	*P*-value
Gay bar/disco				
Yes	241 (75)	80	20	0.0001
No	78 (25)	56	44	
Gay party				
Yes	172 (55)	79	21	0.04
No	144 (45)	68	32	
Cruising area				
Yes	77 (24)	60	40	0.001
No	243 (76)	79	21	
Gay sauna				
Yes	80 (25)	79	21	0.29
No	239 (75)	73	27	
Sex cinema				
Yes	25 (8)	60	40	0.09
No	295 (92)	75	25	
Gay association				
Yes	78 (25)	80	20	0.23
No	241 (75)	73	27	
Gay sites on the Internet				
Yes	237 (74)	76	24	0.11
No	83 (26)	68	32	

Table 4 Summary of hierarchical logistic regression analysis for factors predicting awareness of the possibility to obtain free hepatitis B vaccination programme ($n = 316$)

	OR (95% CI)
Step 1	
Region Utrecht	1.77 (0.95–3.30)
Region South Limburg	1.38 (0.76–2.52)
Step 2	
Region Utrecht	1.70 (0.91–3.20)
Region South Limburg	1.18 (0.63–2.19)
Age	0.97 (0.95–0.99)
Step 3	
Region Utrecht	1.52 (0.80–2.90)
Region South Limburg	1.23 (0.65–2.31)
Age	0.97 (0.95–0.99)
Sexual attraction	3.59 (1.56–8.25)
Step 4	
Region Utrecht	1.53 (0.79–2.97)
Region South Limburg	1.30 (0.66–2.58)
Age	0.99 (0.96–1.01)
Sexual attraction	2.59 (1.09–6.18)
Gay bar/disco	2.39 (1.32–4.35)
Cruising area	0.60 (0.32–1.13)

Nagelkerke $R^2 = 0.14$, $P = 0.003$ for Step 4, $P = 0.000$ for the model
To avoid multicollinearity due to high correlation with other variables measured in our study, the variables 'sexual identity', 'having sex with women' (which largely overlaps with 'sexual attraction') and visiting gay parties (which overlaps with visiting gay bars/discos), and visiting sex cinemas (which overlaps with visiting cruising areas) were excluded from the multivariate analysis
Finally, despite the fact that they are marginally significant on a univariate level, the variables that measure receptive intercourse and receptive oral sex with casual sex partners were excluded because these variables represent only the selective group of MSM that actually has sex with casual partners

participated in the vaccination programme, but nevertheless reported to be vaccinated against hepatitis B, a large proportion (39%) was vaccinated because of their work in health care (data not shown).

Univariate analyses were performed within the groups of MSM who were aware that they could opt for free hepatitis B vaccination and were eligible for vaccination (Those who were vaccinated outside the free vaccination programme, or had been infected with the hepatitis B virus were excluded from the analyses) ($n = 148$). Only the results with $P < 0.05$ are described below. In Rotterdam, the vaccination rate was lower (30%) than in Utrecht (61%) and South Limburg (66%); $P = 0.001$. Furthermore, MSM who had sex with casual partners in the past 6 months were more likely to be vaccinated: 60% of MSM with casual sex partners had obtained vaccination, compared with 41% among those without casual sex partners ($P = 0.03$). Among those who had sex with casual partners in the past 6 months, MSM who had insertive intercourse with casual sex partners, 76% reported to be vaccinated compared with 49% of MSM who had sex with casual partners but who had not performed insertive intercourse (data not shown). Analyses including the other sociodemographic and behavioural variables shown in tables 1, 2 and 3 showed no significant differences.

To examine the association between personal information (received from professionals) and non-personal information (via flyers, posters, etc.) about the vaccination programme and vaccination uptake, a univariate analysis was performed. This analysis showed that among those who were personally informed by STD prevention workers, a higher proportion was vaccinated compared with those who were informed via flyers, posters, friends, etc. (67% vs. 47%, $P = 0.03$) (data not shown).

The region that was studied, having had casual sex partners, and receiving personal information about the programme from Public Health Service staff are significantly associated with hepatitis B vaccination uptake after multivariate adjustment (table 5).

MSM who did not obtain vaccination but were eligible for vaccination reported different reasons for non-participation, mainly: not perceiving a risk for getting infected with the virus, not having time to obtain vaccination, laziness and not thinking about the hepatitis B vaccine.

Compliance with the hepatitis B vaccination schedule

Of eligible MSM (those who received the first vaccination at least 6 months prior to the interview; thus had the chance to complete the vaccine series; $n = 61$), 84% received three vaccinations or more, 15% received two vaccinations and 2% received only one vaccination. Because of the high number of MSM who finished the vaccination programme in our sample, we were unable to calculate all univariate statistics (such as chi-square) to explore differences between MSM who complied with the vaccination procedure and those who did not. The condition that a maximum of 20% of the expected cell frequencies is between 1 and 5 was not fulfilled.[7] Because none of the associations showed a *P*-value <0.10 on a univariate level, no multivariate model was performed. Although those who complied with the vaccination schedule were ~5 years older than those who did not comply, age and the number of casual sex partners were not significantly associated with compliance (data not shown). MSM who were eligible for hepatitis B vaccination (who were not immune), but did not comply with the vaccination schedule reported lack of knowledge about the vaccination procedure and delaying to call for a new appointment as the main reasons for non-compliance.

Table 5 Summary of hierarchical logistic regression analysis for factors predicting hepatitis B vaccination uptake ($n = 148$)

	OR (95% CI)
Step 1	
Region Utrecht	3.70 (1.57–8.71)
Region South Limburg	4.64 (1.96–10.98)
Step 2	
Region Utrecht	3.98 (1.65–9.59)
Region South Limburg	5.38 (2.20–13.18)
Casual sex partners	2.57 (1.22–5.43)
Step 3	
Region Utrecht	4.29 (1.74–10.59)
Region South Limburg	5.53 (2.22–13.80)
Casual sex partners	2.65 (1.24–5.68)
Informed by STD Prevention workers	2.53 (1.15–5.54)

STD, sexually transmitted diseases

Nagelkerke $R^2 = 0.22$, $P = 0.02$ for Step 3, $P = 0.000$ for the model

Note: Having insertive intercourse with casual sex partners was excluded from this analysis because this variable is measured only within the specific group of MSM who actually have sex with casual partners

Discussion

Our study shows a high proportion of awareness (74%) with the vaccination programme among MSM in our sample. Awareness was highest among MSM who visit gay bars and discos and who are homosexual as opposed to the bisexual MSM. Gay bars and discos are excellent places to implement a targeted campaign towards MSM; however, a challenge for vaccination programmes targeted at MSM is to reach those who are less 'gay' orientated.

In our sample, 50% of all MSM reported to be vaccinated against hepatitis B (one or more injections). However, since many of these MSM (45%) reported to be vaccinated not as part of the vaccination programme but, for example, because of their work in health care, the actual impact of the vaccination programme was lower than the reported 50% vaccination uptake does suspect.

In one of the study regions, the vaccination uptake was lower. This seems to be of the wider geographical area of that region with more diverse cruising areas, which are less accessible for STD prevention workers to visit. Furthermore, in this wider geographic area it takes on average more time to travel to the local public health service in order to get vaccinated.

Our results showed that perceiving no or a very low risk of infection with the hepatitis B virus was the most important reason for vaccine refusal. Our finding corroborates results of De Wit *et al.*[8] who showed perceived risk of infection with the hepatitis B virus to be a crucial factor related to vaccination uptake among MSM as well. This suggests that communication about the hepatitis B vaccination should address perceived risk of infection. In addition, the communication about the vaccine should be personal, since the personal approach in informing MSM about the free vaccine was shown to be beneficial for vaccination uptake when compared with less outreaching activities such as distributing flyers or hanging up posters. This outcome was also shown by Baars *et al.*[5,6] among drug users and commercial sex workers. Personal conversation can be tailored to the individual in question, whereas posters and flyers are usually developed for a more general public of MSM. Future vaccination programmes should thus focus on this outreach approach and not solely rely on the distribution of flyers and posters.

MSM who are vaccinated are largely completing their three-dose vaccination schedules. The compliance rate shown in the present study (84%) is high compared with other studies reporting, for example, 74%[9] and 69%[10] for the standard schedule (0, 1 and 6 months), 43% for the accelerated schedule (0, 1 and 4 months),[11] and 49% for various other vaccination schedules.[12] Gunn *et al.*[11] showed that direct contact with clients of an STD clinic was beneficial for their compliance with the vaccination schedule.

Our results should be considered in the light of the following limitations. First, the cross-sectional design of the study does not allow us to draw conclusions about causality. Second, because our sample is based on MSM who visit venues, our findings cannot be generalized to the entire population of MSM. Third, all variables measured in our study, including hepatitis B vaccination uptake and compliance rates with the vaccination schedule, were based on self-reported data. Recall or social-desirability bias could undermine the accuracy of self-reports. Rhodes *et al.*[13] found a somewhat lower self-reported hepatitis B vaccination rate of 42% among an Internet sample of MSM from the USA as compared with our results. Whether this difference is due to the impact of the Dutch vaccination programme or differences in community characteristics is not clear. Fourth, only 61 respondents were part of the analyses among those who complied with the vaccination schedule and

those who did not; one reason for this low number is that ~50% of the respondents who were vaccinated reported to be vaccinated not as part of the vaccination programme, and were thus excluded from the analyses; this is far more than we had expected beforehand. Because of the high completion rate (84%) the conditions of chi-square tests could not be fulfilled; therefore, we were unable to investigate many of the factors related with compliance.

Conclusions

Since homosexual contact is considered a risk for getting infected with the hepatitis B virus, it is important to vaccinate the members of this community. The present study shows that a high percentage (74%) of MSM was aware of the opportunity to obtain free hepatitis B vaccination. We recommend community health services to also focus on less accessible locations where important groups, such as bisexuals, can be found in order to enlarge the reach of this programme. Furthermore, personal communication was found to be beneficial for vaccination uptake and we recommend STD prevention workers to address perceived risk of infection with the hepatitis B virus, since this is the major reason for refusing the vaccine.

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Conflicts of interest: None declared.

Key points

- In The Netherlands a hepatitis B vaccination programme is targeted at MSM. A high proportion of MSM is aware of the opportunity to obtain free hepatitis B vaccination.
- Among MSM, perceived risk to become infected with the virus is important to address in the communication about the hepatitis B vaccination.
- A personal approach by STD prevention workers is beneficial for vaccination uptake among MSM

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