DOI: 10.1111/j.1468-1293.2011.00959.x

ORIGINAL RESEARCH

Late presentation of HIV infection among adults in New Zealand: 2005–2010

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Background

Early diagnosis of HIV infection is important for the individual and for disease control. A consensus was recently reached among European countries on definitions of timing of presentation for care: 'Late presentation' refers to entering care with a CD4 count <350 cells/μL or an AIDS-defining event, regardless of the CD4 count. Presentation with 'advanced HIV disease' is a subset having a CD4 count <200 cells/μL and also includes all who have an AIDS-defining event regardless of CD4 count. This study examines timing of presentation in New Zealand from 2005 to 2010.

Methods

Since 2005, information on the initial CD4 cell count has been requested on all people newly diagnosed with HIV infection through antibody testing in New Zealand. Excluded in this analysis were those previously diagnosed overseas or for an immigration medical.

Results

A CD4 cell count was provided for 606 (80.3%) of the 755 newly diagnosed adults. Overall, 50.0% were 'late presenters' and 32.0% had 'advanced HIV disease'. Compared with men who have sex with men (MSM), people heterosexually infected were more likely to present late. 'Late presentation' and presentation with 'advanced HIV disease' were significantly more common among older MSM. Māori and Pacific MSM were more likely to present with 'advanced HIV disease'. Compared with European MSM, the age-adjusted relative risks for Māori and Pacific MSM were 2.1 [95% confidence interval (CI) 1.4–3.2] and 2.5 (95% CI 1.2–5.0), respectively.

Conclusions

The high proportion of people presenting late reflects inadequate levels of HIV testing. The lower proportion of late presentations among MSM compared with those heterosexually infected may be explained by a higher proportion of recent locally acquired infections together with different testing patterns.

Keywords: CD4 cell count, HIV, late presentation, New Zealand

Accepted 19 August 2011

Introduction

There is overwhelming evidence that the early diagnosis of HIV infection is important both for the individual and for controlling spread in a population. With early diagnosis and treatment, outcome is improved, and the risk of transmission can be reduced by reducing individuals' infectivity through antiretroviral therapy (ART) and by behaviour change [1–3].

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Although there is variation in the clinical course of HIV infection, an indication of late diagnosis is given by the presence of clinical or laboratory evidence of immunosuppression at diagnosis. Such parameters have been used to compare late diagnosis between groups and over time [4]. Most of the published reports have used information on whether the person met criteria for AIDS at the time of HIV diagnosis, or on the basis of an initial CD4 cell count of <200 cells/μL. However, while previously a CD4 cell count of that level was considered the minimum threshold for ART (with the decision individualized for those with higher counts), there is now general agreement that the minimum should be 350 cells/μL [5–7]. In line with this, a consensus

has recently been reached among European countries on two definitions reflecting delayed presentation for care. 'Late presentation' refers to entering care with a CD4 count <350 cells/μL or an AIDS-defining event, regardless of the CD4 count. Presentation with 'advanced HIV disease' is a subset having a CD4 count <200 cells/μL and also includes all who have an AIDS-defining event regardless of CD4 count [8].

In New Zealand, the early epidemic of AIDS and HIV infection was highly concentrated among men who have sex with men (MSM) [9]. Over time the proportion of people diagnosed with AIDS and HIV infection who were heterosexually infected increased. However, while most infections among MSM were acquired in New Zealand, the majority of those heterosexually infected acquired their infection overseas, and were predominately people from countries where heterosexual transmisson of HIV is common. Between 2000 and 2005 there was a marked rise in the annual number of HIV diagnoses among both groups. Since 2005, the number of MSM diagnosed annually has remained higher than in the 1990s but relatively stable and the number heterosexually infected has dropped as a result of a reduction in those infected outside the country. The most recent national anonymized sentinel surveys among sexual health clinic attenders (in 2005/2006) found a prevalence of 4.4% among MSM, 0.1% among heterosexual men and women, and 0.3% among those injecting drugs but not reporting any current or past homosexual activity [10].

The aim of this study was to examine the frequency and characteristics of people presenting late, and with advanced HIV disease, among adults diagnosed in New Zealand from the start of 2005 (when information on the CD4 cell count was first obtained) to the end of 2010.

Methods

The AIDS Epidemiology Group (AEG) has undertaken surveillance of HIV infection and AIDS in New Zealand since 1989, through contracts with the Department, and subsequently the Ministry, of Health. This report uses information on the timing of HIV and AIDS diagnoses (if the latter had occurred), and the initial CD4 cell count for adults (over the age of 15 years) diagnosed with HIV infection in New Zealand through antibody testing from 2005 to 2010. Excluded are those tested as part of an immigration medical assessment, as this was compulsory for most of the period, and those previously diagnosed overseas and having a repeat test in New Zealand.

Since testing for HIV infection became available in 1985, anonymous information on age, sex and means of infection has been supplied by the two laboratories that perform confirmatory HIV antibody testing. Since 1996, clinicians requesting the confirmatory HIV test were asked to provide extra information on all new HIV diagnoses, including the reason for the HIV test, ethnicity, place of infection, whether the individual had previously had a negative HIV test and, if so, when the last test was undertaken [11]. Notifications do not give a name, but use a code derived from the person's initials, sex and date of birth. Since 2005, information on the initial CD4 cell count after diagnosis has been requested. Individuals tested for HIV infection through viral load testing who have not had an HIV antibody test are included in national surveillance but were not included in this analysis as most had previously been diagnosed overseas, and hence information on their first CD4 cell count was not sought. For the purpose of this study, the timing of HIV diagnosis was taken as the end date of the month the sample was confirmed as positive.

AIDS has been a notifiable disease in New Zealand since 1983, coded as for HIV reporting, and sent to the AEG. AIDS is defined according to the list of AIDS-defining conditions developed by the US Centers for Disease Control and Prevention [12]. When the date of AIDS diagnosis was not available, the HIV report was reviewed and, if an AIDS-defining condition was mentioned at diagnosis of HIV infection, the two diagnoses were considered to have been made simultaneously. Where information differed between the AIDS notification and that provided at HIV diagnosis, the former was used.

Two measures of timing of presentation were used. 'Late presentation' refers to entering care with a CD4 count <350 cells/μL or an AIDS-defining event within 3 months of HIV diagnosis, regardless of the CD4 count. Presentation with 'advanced HIV disease' is a subset having a CD4 count <200 cells/μL and also includes all who have an AIDS-defining event within 3 months of HIV diagnosis regardless of CD4 count.

Statistical methods

Relative risks were calculated using Poisson regression with robust standard errors to account for the binary outcome. Age-adjusted estimates were obtained by including a quadratic relationship with age at diagnosis [13]. Data were analysed using STATA 11.0 (StataCorp, College Station, TX) [14].

Results

During the period 1 January 2005 to 31 December 2010 there were 978 adults diagnosed with HIV infection through antibody testing in New Zealand; of these, 198 were tested as part of an immigration medical, and 25 had

Table 1 Relationship between initial CD4 cell count and having an AIDS diagnosis within 3 months of HIV diagnosis

AIDS diagnosis within 3 months of HIV diagnosis	Initial CD4 cell count				
	<200 cells/μL	200–349 cells/μL	≥350 cells/μL	Unknown	Total
Yes	82	6	0	13	101
No	106	109	303	136	654
Total	188	115	303	149	755

Table 2 Relative risks (RRs) of 'late presentation' and 'advanced HIV disease' according to means of infection

Means of infection	Total HIV diagnoses	Total HIV diagnoses with CD4 cell count	'Late presentation'*		'Advanced HIV disease'†	
			n (%)	RR (95% CI)	*n* (%)	RR (95% CI)
MSM	449	374	153 (40.9)	Ref.	93 (24.9)	Ref.
Heterosexual	235	202	127 (62.9)	1.5 (1.3–1.8)	85 (42.1)	1.7 (1.3–2.1)
Other	13	10	8 (80.0)	1.9 (1.4–2.7)	6 (60.0)	2.4 (1.4–4.1)
Unknown	58	20	15 (75.0)	1.8 (1.4–2.4)	10 (50.0)	2.0 (1.2–3.6)
Total	755	606	303 (50.0)		194 (32.0)	

CI, confidence interval; MSM, men who have sex with men.
*CD4 count <350 cells/μL or AIDS diagnosis within 3 months.
†CD4 count <200 cells/μL or AIDS diagnosis within 3 months.

been previously diagnosed overseas, leaving 755 for this study. An initial CD4 cell count was provided for 80.3% of these individuals (606 of 755) (Table 1). The proportion of those with a CD4 cell count available who had a diagnosis of AIDS within 3 months of their HIV diagnosis was 14.5% (88 of 606), compared with 8.7% (13 of 149) for those for whom a CD4 cell count was not available ($P = 0.06$).

Of those with an available initial CD4 cell count, 50.0% (303 of 606) were 'late presenters', and 32.0% (194 of 606) had 'advanced HIV disease' (Table 2). Overall, the median CD4 count was 346 cells/μL. MSM were least likely to be 'late presenters' and to present with 'advanced HIV disease'. The median CD4 count was 404 cells/μL for MSM, and 271 cells/μL for those heterosexually infected.

Among MSM there was no significant change in the proportion presenting late over the years 2005–2010 (P for trend = 0.11 for 'late presentation' and 0.21 for 'advanced HIV disease'). Table 3 shows that presenting late was significantly more common among older MSM, with the age difference more marked among those with 'advanced HIV disease'. MSM of Māori ethnicity were more likely to present with 'advanced HIV disease' compared with those of European ethnicity. The relative risk (RR) for Pacific MSM was higher than for Māori MSM; however, the numbers were smaller and the finding did not reach statistical significance. Adjustment for age increased the estimated RR of presenting with 'advanced HIV disease' to 2.1 [95% confidence interval (CI) 1.4–3.2] for Māori MSM, and to 2.5 (95% CI 1.2–5.0) for Pacific MSM, which was then significantly raised compared with European MSM. There were no differences in 'late presentation' among MSM by ethnicity; adjustment for age increased the RRs only slightly and they remained nonsignificant. There were no differences in presenting late by country of infection. Not surprisingly, MSM tested because of 'risk' or being 'screened' were less likely to present late, with the difference being more marked for 'advanced HIV disease'. Compared with those with a negative test within the previous 2 years, indicating new infection since then, those having a negative HIV test more than 2 years earlier, or never, were considerably more likely to present late.

To explore the possible reasons for the observed pattern of late presentation by age and by ethnicity among MSM, the relationship between these characteristics and past HIV testing was examined (Table 4). Younger MSM were more likely to have had a negative HIV test within the previous 2 years and less likely to have never been tested ($P < 0.001$). While testing in the previous 2 years was similar among European and Māori MSM, it was less common among Pacific MSM, although there were few in this group; and both Māori and Pacific MSM were more likely to have never been tested. Overall the pattern of past testing was not statistically significantly different by ethnicity ($P = 0.57$).

Among those heterosexually infected, there was also no significant trend in presenting late over the period of study (P for trend = 0.44 for 'late presentation' and 0.35 for 'advanced HIV disease'). Presenting with 'advanced HIV disease' was significantly less common among the women than among the men, but this difference was removed after

Table 3 Relative risks (RRs) of 'late presentation' and 'advanced HIV disease' according to characteristics of men who have sex with men (MSM) (restricted to those with CD4 cell counts)

		'Late presentation'			'Advanced HIV disease'		
Characteristic	**Total**	***n* (%)**	**RR (95% CI)**		***n* (%)**	**RR (95% CI)**	
Age at diagnosis							
<30 years	84	19 (22.6)	1.0		5 (5.9)	1.0	
30–39 years	111	40 (36.0)	1.6 (1.0–2.5)		27 (24.3)	4.1 (1.6–10.2)	
≥40 years	179	94 (52.5)	2.3 (1.5–3.5)		61 (34.1)	5.7 (2.4–13.7)	
Ethnicity				Adjusted for age*			Adjusted for age*
European	261	110 (42.1)	1.0	1.0	60 (23.0)	1.0	1.0
Māori	49	20 (40.8)	1.0 (0.7–1.4)	1.1 (0.8–1.6)	18 (36.7)	1.6 (1.0–2.4)	2.1 (1.4–3.2)
Pacific Island	9	4 (44.4)	1.0 (0.5–2.2)	1.1 (0.6–2.3)	4 (44.4)	1.9 (0.9–4.1)	2.5 (1.2–5.0)
Other	52	18 (34.6)	0.8 (0.6–1.2)	0.9 (0.6–1.4)	11 (21.1)	0.9 (0.5–1.6)	1.2 (0.7–2.1)
Unknown	3	1 (33.3)	0.8 (0.2–3.9)		0 (0.0)	–	
Place of infection							
New Zealand	296	117 (39.5)	1.0		71 (24.0)	1.0	
Overseas	67	32 (47.8)	1.2 (0.9–1.6)		20 (29.8)	1.2 (0.8–1.9)	
Unknown	11	4 (36.4)	0.9 (0.4–2.0)		2 (18.2)	0.8 (0.2–2.7)	
Reason for testing							
Symptoms	150	92 (61.3)	1.0		71 (47.3)	1.0	
Risk	170	47 (27.6)	0.4 (0.3–0.6)		18 (10.6)	0.2 (0.1–0.4)	
Screening	38	12 (31.6)	0.5 (0.3–0.8)		3 (7.9)	0.2 (0.05–0.5)	
Other	6	1 (16.7)	0.3 (0.04–1.6)		1 (16.7)	0.3 (0.06–2.1)	
Unknown	10	1 (10.0)	0.2 (0.02–1.0)		0 (0.0)	–	
Previous negative test							
Within past 2 years	125	31 (24.8)	1.0		8 (6.4)	1.0	
>2 years or time unknown	82	36 (43.9)	1.8 (1.2–2.6)		27 (32.9)	5.1 (2.5–10.8)	
Never/unknown	167	86 (50.9)	2.2 (1.5–3.1)		58 (34.7)	5.8 (2.8–11.7)	
Total	374	153			93		

CI, confidence interval.
*Adjusted in Poisson regression model by including age as a quadratic.

Table 4 Relationship between previous negative HIV test and age and ethnicity among men who have sex with men (MSM)

	Previous negative HIV test					
Characteristic	**Within past 2 years**	**> 2 years or time unknown**	**Never**	**Unknown**	**Total**	***P* value***
Age						
<30 years	47 (62.7)	8 (10.7)	20 (26.7)	9	84	
30–39 years	40 (38.5)	25 (24.0)	39 (37.5)	7	111	
≥ 40 years	38 (23.6)	49 (30.4)	74 (45.9)	18	179	<0.001
Ethnicity						
European	90 (37.6)	62 (25.9)	87 (36.4)	22	261	
Māori	16 (34.8)	9 (19.6)	21 (45.6)	3	49	
Pacific	1 (12.5)	2 (25.0)	5 (62.5)	1	9	
Other	16 (35.6)	9 (20.0)	20 (44.5)	7	52	0.57
Unknown	2	0	0	1	3	
Total	125 (36.8)	82 (24.1)	133 (39.1)	34	374	

*Those with an unknown previous negative HIV test or unknown ethnicity were excluded from calculation of the percentages and the *P* value.

adjusting for age (RR = 0.8; 95% CI 0.6–1.2). No difference was seen between men and women in the risk of 'late presentation' (Table 5). As with MSM, those presenting when aged 40 years or older were more likely to be late, the difference being more extreme for 'advanced HIV disease'. In the age- and sex-adjusted analysis there were no significant ethnic differences in people with 'advanced HIV disease'. The adjusted RR for 'late presentation' was significantly elevated for those of Pacific ethnicity (1.8; 95% CI 1.1–2.9) and those of 'other' ethnicity (1.4; 95% CI 1.0–1.9) compared with those of European ethnicity. Those infected overseas were more likely to have 'advanced HIV disease' at diagnosis or 'late presentation', as were heterosexuals tested because of 'symptoms'. Those who had never had a

Table 5 Relative risks (RRs) of 'late presentation' and 'advanced HIV disease' according to characteristics of heterosexual men and women (restricted to those with CD4 cell counts)

		'Late presentation'			'Advanced HIV disease'		
Characteristic	**Total**	***n*** **(%)**	**RR (95% CI)**		***n*** **(%)**	**RR (95% CI)**	
Sex				Adjusted for age*			Adjusted for age*
Male	99	66 (66.7)	1.0	1.0	50 (50.5)	1.0	1.0
Female	103	61 (59.2)	0.9 (0.7–1.1)	0.8 (0.6–1.2)	35 (34.0)	0.7 (0.5–0.9)	1.0 (0.8–1.2)
Age							
<30 years	49	24 (49.0)	1.0		12 (24.5)	1.0	
30–39 years	74	45 (60.8)	1.2 (0.9–1.7)		29 (39.2)	1.6 (0.9–2.8)	
≥ 40 years	79	58 (73.4)	1.5 (1.1–2.0)		44 (55.7)	2.3 (1.3–3.9)	
Ethnicity				Adjusted for age and sex*			Adjusted for age and sex*
European	53	27 (50.9)	1.0	1.0	23 (43.4)	1.0	1.0
Māori	16	10 (62.5)	1.2 (0.8–1.9)	1.3 (0.8–2.0)	8 (50.0)	1.1 (0.6–2.1)	1.2 (0.7–2.0)
Pacific Island	11	8 (72.7)	1.4 (0.9–2.2)	1.8 (1.1–2.9)	5 (45.4)	1.0 (0.5–2.1)	1.6 (0.8–3.4)
Other	122	82 (67.2)	1.3 (1.0–1.8)	1.4 (1.0–1.9)	49 (40.2)	0.9 (0.6–1.3)	1.0 (0.7–1.5)
Place of infection							
New Zealand	67	33 (49.2)	1.0		21 (31.3)	1.0	
Overseas	128	89 (69.5)	1.4 (1.1–1.8)		60 (46.9)	1.5 (1.0–2.2)	
Unknown	7	5 (71.4)	1.4 (0.9–2.5)		4 (57.1)	1.8 (0.9–3.8)	
Reason for testing							
Symptoms	95	75 (78.9)	1.0		61 (64.2)	1.0	
Risk	66	35 (53.0)	0.7 (0.5–0.9)		14 (21.2)	0.3 (0.2–0.5)	
Screening	28	7 (25.0)	0.3 (0.2–0.6)		3 (10.7)	0.2 (0.06–0.5)	
Other	8	5 (62.5)	0.8 (0.4–1.4)		2 (25.0)	0.4 (0.1–1.3)	
Unknown	5	5 (100.0)	1.3 (1.1–1.4)		5 (100.0)	1.6 (1.3–1.8)	
Previous negative test							
Within past 2 years	20	6 (30.0)	1.0		2 (10.0)	1.0	
> 2 years or time unknown	14	7 (50.0)	1.8 (0.7–3.9)		1 (7.1)	0.7 (0.07–7.2)	
Never/unknown	168	114 (67.9)	2.3 (1.1–4.5)		82 (48.8)	4.9 (1.3–18.4)	
Total	202	127			85		

CI, confidence interval.
*Adjusted in Poisson regression model by including age as a quadratic.

prior negative test were more likely to have 'advanced HIV disease' or 'late presentation'. Prior testing was rare, however, with around three-quarters of both men and women never previously being tested, and only 10% of both genders having been tested in the previous 2 years.

Discussion

The main findings are that in recent years, among those opting to have an HIV test in New Zealand, half of those diagnosed with HIV infection were 'late presenters', having an initial CD4 cell count below the level at which treatment is currently recommended, and just under one-third had 'advanced HIV disease'. Overall, MSM were less likely to present late, and the proportion doing so decreased with decreasing age. In age-adjusted analyses, Māori and Pacific MSM were more likely than those of European ethnicity to have 'advanced HIV disease'. Unsurprisingly, those who had had a negative HIV test in the previous 2 years were less likely to present late, as were those tested for reasons other than symptoms.

Strengths of this study were that information on the means of infection and demographic characteristics were available for the vast majority of people diagnosed in New Zealand, and the same code for HIV reporting and AIDS notification allowed linkage of the timing of the diagnosis of HIV infection and AIDS. While an initial CD4 cell count was available for a large proportion of our sample (80.3%), those for whom this was not available were less likely to meet clinical criteria for AIDS around the time of diagnosis, so our reported proportion presenting late may slightly overestimate that for all people diagnosed.

The proportion of late presentation in a group depends on: (a) current and past testing; (b) the pattern of the underlying epidemic, particularly its duration and recent infection rate; and (c) the rate of HIV progression once infection has occurred. For example, not only will the proportion presenting late be higher if there has been less HIV testing, but also if the epidemic in that group has been longstanding.

Late presentation was less common among MSM than among those heterosexually infected. More testing among MSM is likely to be a major reason for this, as overall they were very much more likely to have had a previous recent HIV test. Higher rates of HIV testing among MSM were also shown in New Zealand sexual health clinics [10]. This may

not, however, be the whole explanation. In the early 2000s HIV diagnoses in New Zealand among both MSM and heterosexual men and women increased. Among MSM the increase was predominantly a result of a rise in infections acquired in New Zealand, suggestive of local ongoing transmission among this group. However, most of the rise of heterosexually acquired infections was a result of more people having been infected overseas, predominantly people from high-prevalence countries in sub-Saharan Africa. Hence, the lower proportion of late diagnoses among MSM may also be a result of a higher proportion of recent infections in this group.

On the other hand, the larger proportion of older MSM presenting late could be a reflection of a more established epidemic among these men, with the previously undiagnosed men having been infected for longer, or alternatively could be a result of their HIV infection having progressed more rapidly, as has been noted [15]. The former is the more likely explanation, as fewer MSM aged 40 years or over had had a negative HIV test in the previous 2 years than men in the younger groups. In addition, among those infected less than 2 years before diagnosis (based on having had a previous negative test), the CD4 cell count was not lower among the oldest group of men (data not shown).

The other major difference among the MSM was by ethnicity. Compared with those of European ethnicity, Māori MSM were about twice, and Pacific MSM two-and-a-half times, more likely to present with 'advanced HIV disease' after adjustment for age. There is no reason to believe that the HIV epidemic among MSM in these ethnic groups is more mature compared with MSM of European ethnicity, or that they have a faster disease progression, so the difference is most likely to reflect different patterns of testing. Among those for whom the information was known, 63.6% of the European MSM had ever had a negative HIV test, compared with 54.5% of the Māori MSM and 37.5% of the Pacific MSM. A difference in HIV testing by ethnicity, particularly lower rates among Pacific MSM, has also been seen in community surveys. In the 2006 Gay Auckland Periodic Sex Survey (GAPSS) [16], the respective proportions for these ethnic groups were 77, 75 and 40%, and in the 2008 GAPSS, 80, 77 and 60% [17].

The use of agreed definitions for late presentation allows international comparisons. The proportion of 'late presentations' among people diagnosed with HIV infection in the European Union (EU) in 2009 has recently been reported [18]. Among the 28 EU countries that report on HIV diagnoses, 18 countries monitored initial CD4 cell counts, 11 of which obtained this information on more than half of the cases. The 2009 data for these countries (Table 6) show that the proportion of cases for which we had this information in New Zealand for 2005–2010 (80%) was only surpassed by two of these countries. The proportion of 'late presentations' among MSM in New Zealand was similar to that in the UK, France and Spain but higher than that in six other countries. Among heterosexually infected people, the proportion of 'late presentations' was again similar to that in the UK and also to that in the Netherlands, but higher than that in seven other countries, although our exclusion of people diagnosed through immigration might have affected this comparison. These comparisons show that in recent years New Zealand has a very similar pattern of late presentation to that found in the UK and several other Northern European countries.

Table 6 Proportion of 2009 HIV diagnoses with known CD4 cell count in 11 European Union countries (for which this was known for more than half of cases), and the proportion of men who have sex with men (MSM) and heterosexually infected individuals with an initial count <350 cells/μL (equivalent New Zealand data for 2005–2010 are also shown)

	Proportion with CD4 cell count (%)	Proportion <350 cells/μL	
		MSM (%)	Heterosexual (%)
Cyprus	76	38	43
Czech Republic	75	28	65
Denmark	77	39	58
France	54	41	59
Luxembourg	70	25	20
Netherlands	80	39	62
Romania	80	–	31
Slovakia	77	34	67
Slovenia	88	50	33
Spain	87	42	59
UK	66	40	63
New Zealand (2005–2010)	80	41	63

In Australia, initial CD4 cell counts were also available for about 80% of people diagnosed with HIV infection over the period 2005–2008 [19]. The initial CD4 count was <200 cells/μL for about 20% of all patients for whom this was available; and <350 cells/μL for about 40%, somewhat lower than our comparable proportions of 31 and 50%. The median CD4 count among all MSM diagnosed with HIV infection in Australia in the period 2005–2009 was 460 cells/μL, slightly higher than for MSM in New Zealand for 2005–2010, for whom it was 404 cells/μL. As both Australia and New Zealand have had recent increases in the number of new infections of HIV among MSM, this suggests less testing in New Zealand. This is supported by gay community periodic surveys in Australia which in 2008 found rates of HIV testing in the previous 12 months of between 52 and 62% [20], compared with 45% in a similar survey in Auckland in that year.

The major implication of these findings is that more efforts should be made to diagnose HIV infection early. Delayed testing has an impact not only on the well-being of individuals but also on the future spread of the epidemic in populations and groups. Mathematical modelling in Australia suggests that those with undiagnosed chronic HIV infection are likely to be responsible for a disproportionate number of new infections [21]. It also illustrated that testing coverage can influence future incidence and diagnosis rates.

In 2008, the New Zealand Ministry of Health supported and propagated guidelines for HIV testing in medical settings [22]. This included recommendations that all persons with a history of unprotected sexual exposure that could result in HIV transmission, specifically MSM and those seeking assessment for sexually transmitted infections, should be offered testing. It is important that this guideline is promoted, and the impact assessed, including collecting information on HIV testing according to sexual behaviour. Moreover, the possibility of HIV infection should be considered in a wide range of clinical situations. Testing needs to be encouraged particularly among Pacific and Māori MSM, who need to be made aware of the value of HIV testing and of accessible venues where this can be undertaken. Our findings also show that testing for HIV must be considered for people of all ages if they are currently, or have been in the past, at risk. In the area of sexual health the emphasis tends to be on young people, but age should not be a major arbiter of HIV testing.

Acknowledgements

The AIDS Epidemiology Group is funded by the New Zealand Ministry of Health. The authors acknowledge the long-term commitment from clinicians who provide information on people diagnosed with HIV infection in New Zealand.

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