

A profile of HIV testing in Victoria, 1984 to 2004

Megan SC Lim, Rebecca J Guy, Margaret E Hellard
Centre for Epidemiology and Population Health Research
Macfarlane Burnet Institute for Medical Research and Public Health

Abstract

HIV testing is an important public health strategy and collection of HIV testing data is a component of overall HIV surveillance activities. This paper describes changes in HIV testing patterns in relation to HIV diagnoses in Victoria between 1984 and 2004. HIV testing and diagnosis data were extracted from surveillance databases maintained at the Burnet Institute. The annual number of HIV tests performed in Victoria increased from 2,879 in 1984, to 193,927 in 2004. Between 1991 and 2004, the male HIV testing rate per 100,000 population increased from 2,754 to 3,710 and the female rate from 2,395 to 4,453. The proportion of HIV tests conducted by private laboratories increased from less than 1 per cent in 1991 to 75 per cent in 2004. The number of HIV diagnoses increased from 140 in 1999 to 233 in 2002 and then fell to 217 in 2004. The HIV diagnosis rate per 100,000 tests increased from 98.9 in 1999 to 137.7 in 2000 then decreased to 111.9 in 2004. The overall rate of HIV diagnosis per 100,000 tests was 291.6 for males and 25.9 for females. Increased testing among males is a good outcome considering the majority of HIV diagnoses in Victoria are among men who have sex with men (MSM). Increased testing among females probably relates to increased antenatal screening. The inability to collect sexual orientation and reason for test data limited interpretations. To provide a better understanding of the impact of testing on the HIV epidemiology, especially among MSM, linked HIV sentinel surveillance has been implemented in Victoria. *Commun Dis Intell* 2006;30:366–372.

Keywords: HIV test, HIV epidemiology, laboratories, diagnosis rate, HIV surveillance

Introduction

In Victoria, HIV passive surveillance involves case reporting of all new HIV diagnoses to the Burnet Institute. The Burnet Institute manages HIV surveillance on behalf of the Department of Human Services (DHS) and in collaboration with the Victorian Infectious Diseases Reference Laboratory (VIDRL). HIV passive surveillance has shown that the number of new HIV diagnoses in Victoria increased by 60 per cent between 1999 and 2003 (from 140 to 225 annual diagnoses) and approximately 70 per cent of diagnoses were among men who have sex with men (MSM).¹

HIV testing data is an important element of HIV surveillance as it provides a denominator to help interpret passive surveillance data. Passive surveillance is simple, however data generated from the system can be difficult to interpret as trends over time may also be influenced by access to testing and other factors that may affect people's willingness to be tested for HIV. Testing data can be useful

in evaluating the impact of interventions, policy, and HIV programs aimed at increasing awareness of HIV and promoting testing. For example, after the Grim Reaper campaign in 1987, data from South Australian testing laboratories suggested that there had been little change in the testing practices of those at risk, whereas there was a large increase in testing by those at low HIV risk.²

HIV testing first became available in Victoria in late 1984 and was originally performed by the Red Cross Blood Bank (RCBB) and four laboratories; the Microbiological Diagnostic Unit (MDU), the State Reference Laboratory at Fairfield Hospital (now VIDRL), the Royal Melbourne Hospital and the Alfred Hospital.³ Selected private laboratories were authorised to conduct HIV tests in 1991, and as of 2004 there were 31 laboratories (including 28 diagnostic, plus the Victorian Institute of Forensic Medicine (VIFM), CSL, and RCBB authorised by the DHS to perform HIV serology diagnostic testing in Victoria. Testing laboratories all utilise an enzyme linked immunoassay (ELISA) method for their HIV

testing. Sera from positive tests are forwarded to VIDRL for repeat ELISA testing and confirmation by the Western Blot method.

This paper describes the changes in HIV testing numbers, rates and demographics of those tested in comparison to HIV passive surveillance results in Victoria between 1984 and 2004.

Methods

Since 1985, clinicians have been advised by DHS to use a designated HIV request form when requesting an HIV antibody test to accompany the specimen to the laboratory.⁴ This form was designed to capture demographic and epidemiological information on the person being tested including date of birth, sex, postcode, specimen date, reason for test, personal category (MSM, sex worker, drug user, or none of these), and HIV testing history. The form also allows the clinician to record a name code for confidentiality reasons rather than a full name as for other standard laboratory request forms.

The HIV request form has also been used for HIV testing budget allocation. From 1994 until December 2005, Victoria had in place a 'user pays' system for HIV testing, where laboratories could forward specimens collected from individuals who belong to one of several specified risk groups (sex worker, MSM, injecting drug user, homeless youth, or person reporting sexual contact with one of the former) to VIDRL or MDU for free testing.^{5,6} VIDRL and MDU were subsidised by the Government for this testing. Any other individuals not identified as 'high risk' paid a fee of approximately \$20 for HIV testing. This system was established to encourage testing among high risks groups and reduce the amount of funding provided for testing among low risk groups.⁶ However, difficulties in collecting the payment meant most private laboratories stopped collecting this fee from patients in the mid-1990s and for efficiency reasons chose to do the HIV testing in-house at no charge to the patient (in any or no risk group). All positive screening tests were still referred to VIDRL (state HIV reference laboratory) for confirmation using Western Blot. As of November 2005, HIV testing came onto the Pathology Services Table, allowing a Medicare rebate to be received by the patient, and forwarded on to the laboratories (except for life insurance patients).

Over time, the number of requests received by private laboratories for HIV testing has increased markedly and the utilisation of the DHS HIV request form by clinicians has decreased. The DHS HIV request form is now mainly used by a select number of clinics who utilise VIDRL directly for HIV/sexually transmitted infections testing and see a high case load of the high risk groups for HIV infection, i.e. MSM.

As HIV testing was not a Medicare rebatable item in Australia prior to 2006, testing data were not available from the Health Insurance Commission, as with other sexually transmissible infections like *Chlamydia*. Therefore, since 1991 in Victoria, the Victorian DHS Infectious Diseases Regulations specify that all laboratories performing HIV antibody testing are required to report the total number of HIV tests each quarter to the Burnet Institute (on behalf of DHS). Other information collected on the HIV request form and reported to the Burnet Institute by laboratories includes sex, date of birth, patient postcode, personal category, and reason for test. The name code of the patient is not forwarded.

Data sources

HIV testing data between 1991 and 2004 were extracted from the HIV testing database held at the Burnet Institute. Although all variables were recorded on the request form from 1985, electronic data were unavailable prior to 1996, so data from this period were extrapolated from DHS annual infectious disease surveillance reports⁷ and entered into the HIV testing surveillance database. The following time periods were used for analysis: 1984 to 2004 for total test numbers and diagnoses; 1991 to 2004 for sex and laboratory type data—1991 being when this information was first reported, and 1996 to 2004 for data on age.

HIV passive surveillance data between 1984 and 2004 were extracted from the HIV surveillance database also held at the Burnet Institute.

Total HIV testing numbers were obtained annually from the National Reference Laboratory (NRL)—NRL collect these data for national laboratory quality assurance purposes. These data allowed us to assess the completeness of HIV testing data collected by the Burnet Institute.

The Australian Bureau of Statistics census population data for Victoria were used for analysis (1991–1995 from the 1991 census;⁸ 1996–2000 from the 1996 census; and 2001–2004 from the 2001 census).

Statistical analysis

Tests performed for non-diagnostic purposes (the RCBB, CSL and VIFM) were excluded from the analysis.

HIV testing data totals from the NRL were compared with HIV testing data collected by the Burnet Institute; an overall and annual percentage difference was calculated.

HIV testing rates per 100,000 population were calculated by multiplying the number of new HIV tests by 100,000 and dividing by the population. HIV

diagnosis rates per 100,000 tests were calculated by multiplying the number of new HIV diagnoses (taken from the HIV surveillance database) by 100,000 and dividing by the total number of HIV tests for the time period. Rates were also calculated by sex.

Statistical analysis was descriptive and performed using Microsoft Excel and Microsoft Access.

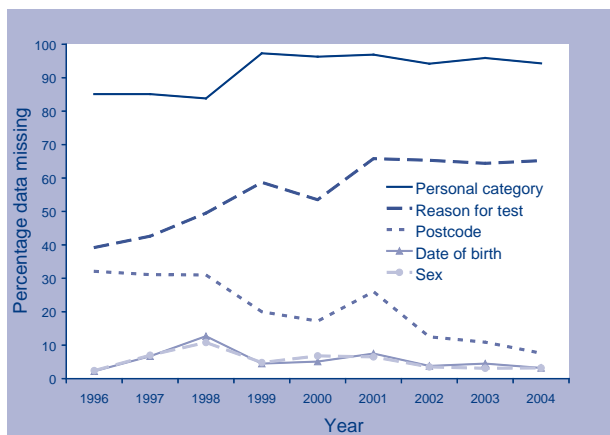
Results

Data quality

The overall number of tests received by the Burnet Institute was similar to the number received by NRL with 0.3 per cent more tests received by Burnet Institute than NRL (annual difference range -4.1% to 6.2%).

Figure 1 shows the proportion of missing data by variable. The proportion of data missing for postcode decreased over time from 32 per cent in 1996 to only eight per cent in 2004. The proportion incomplete for 'reason for test' increased from 39 per cent in 1996 to 68 per cent in 2004; with a larger proportion being incomplete among private laboratories (55% in 1996 and 75% in 2004) compared to public laboratories (38% in 1996 and 42% in 2004). Personal category was consistently greater than 80 per cent incomplete (Figure 1).

Figure 1. Percentage of data missing for each variable, 1996 to 2004, by year

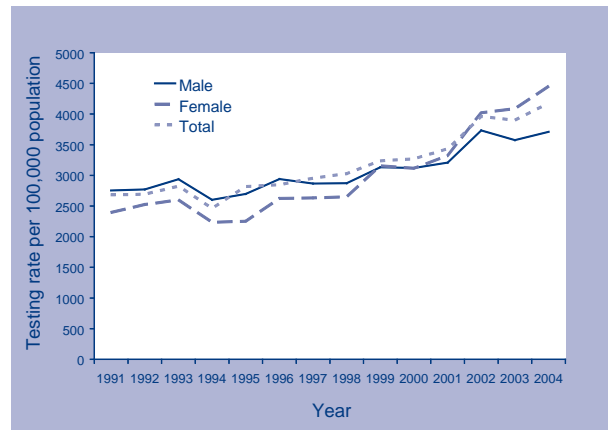


Total tests and testing rates per 100,000 population

Between 1984 and 2004, Victorian laboratories reported 291,301 HIV antibody tests to the Burnet Institute. During this time the number of tests performed per year increased from 2,879 in 1984 to 113,923 in 1991, and to 193,927 in 2004 (Table).

The rate of HIV tests in Victoria per 100,000 population increased from 2,684.2 in 1991 to 4,175.0 in 2004 (Figure 2).

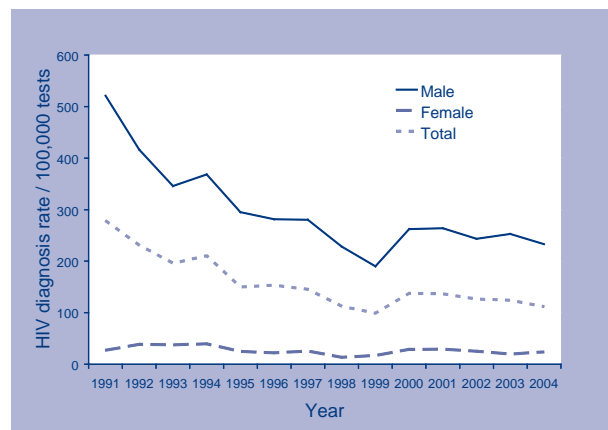
Figure 2. Rate of HIV tests per 100,000 population, Victoria, 1991 to 2004, by sex



HIV diagnoses rate per 100,000 tests

Between 1984 and 2004 there was a total of 5,291 new HIV diagnoses in Victoria. The number of HIV diagnoses decreased from 317 in 1991 to 140 in 1999 then increased by 66 per cent to 233 in 2002 and then fell by 7 per cent to 217 in 2004. In 1991 the diagnoses rate per 100,000 tests was 278.3 per 100,000 tests and similar to the pattern of diagnoses the rate decreased over the next decade to a low of 98.9 diagnoses per 100,000 tests in 1999, increased markedly to 137.7 per 100,000 in 2002, but declined slightly to 111.9 per 100,000 in 2004 (Figure 3).

Figure 3. Rate of HIV diagnoses per 100,000 tests, Victoria, 1991 to 2004, by sex



Sex

Since 1991, of those individuals where sex was known, 49.6 per cent (n=933,883) were male and 50.4 per cent (n=948,697) were female (Table).

Table. Number of HIV tests conducted and number of new HIV diagnoses, Victoria, 1984 to 2004, by sex

| Year | Total HIV tests* | HIV tests: males* | HIV tests: females* | Number of new HIV diagnoses† | HIV diagnoses: males† | HIV diagnoses: females† |
|-------|------------------|-------------------|---------------------|------------------------------|-----------------------|-------------------------|
| 1984 | 2,879 | § | § | 181 | 174 | 4 |
| 1985 | 19,906 | § | § | 526 | 507 | 6 |
| 1986 | 25,130 | § | § | 349 | 333 | 7 |
| 1987 | 51,746 | § | § | 339 | 328 | 8 |
| 1988 | 61,264 | § | § | 289 | 269 | 19 |
| 1989 | 72,700 | § | § | 329 | 309 | 18 |
| 1990 | 96,258 | § | § | 305 | 287 | 16 |
| 1991 | 113,923 | 57,748 | 51,429 | 317 | 301 | 14 |
| 1992 | 114,294 | 58,119 | 54,240 | 264 | 242 | 21 |
| 1993 | 119,831 | 61,580 | 55,808 | 235 | 213 | 21 |
| 1994 | 104,574 | 54,553 | 47,974 | 220 | 201 | 19 |
| 1995 | 119,692 | 56,564 | 48,350 | 179 | 167 | 12 |
| 1996 | 124,547 | 63,245 | 58,314 | 191 | 178 | 13 |
| 1997 | 129,180 | 61,672 | 58,516 | 188 | 173 | 15 |
| 1998 | 132,438 | 61,747 | 58,960 | 149 | 141 | 8 |
| 1999 | 141,498 | 67,343 | 70,104 | 140 | 128 | 12 |
| 2000 | 143,061 | 67,092 | 69,237 | 197 | 176 | 20 |
| 2001 | 159,347 | 73,092 | 78,564 | 218 | 193 | 23 |
| 2002 | 183,981 | 85,088 | 95,138 | 233 | 207 | 24 |
| 2003 | 181,125 | 81,477 | 96,712 | 225 | 206 | 19 |
| 2004 | 193,927 | 84,563 | 105,351 | 217 | 197 | 25 |
| Total | 2,291,301‡ | 933,883§ | 948,697§ | 5,291‡ | 2,723 | 246 |

* From HIV testing surveillance.

† From HIV passive surveillance.

‡ Includes transgender individuals and those where sex is unknown.

§ Sex not available prior to 1991.

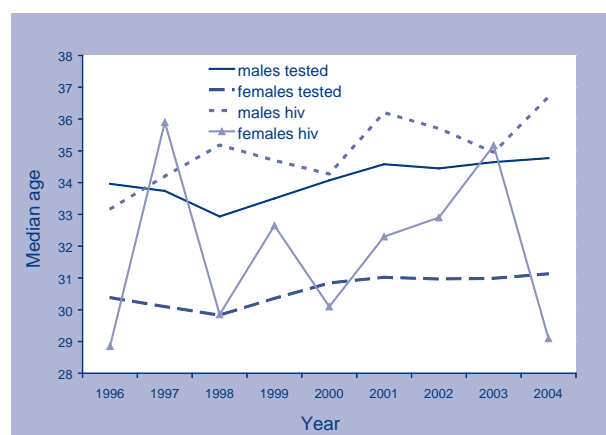
The rate of HIV testing per 100,000 population increased between 1991 and 2004 in both males (from 2,754.3 to 3,710.4) and females (from 2,394.7 to 4,452.9). Between 1991 and 1998 the rate of tests per 100,000 population was higher in males than in females, however since 1999 the rate was higher among females in Victoria (Figure 2).

Between 1991 and 2004, 2,723 males and 246 females were diagnosed with HIV in Victoria (Table). The overall HIV diagnosis rate per 100,000 tests in males was 291.6. The rate decreased from 521.2 in 1991 to 190.1 in 1999 and increased to 243.3 in 2002. The overall female HIV diagnoses rate per 100,000 tests was 25.9, remaining reasonably steady over time.

Age

The overall median age of males tested for HIV was 34.1 years compared to 30.8 years for females. The annual median age of males tested for HIV was

consistently higher than for females and the annual median age of both sexes increased over time (Figure 4).

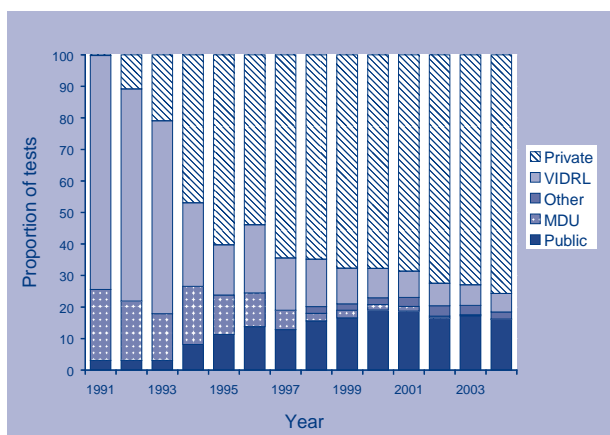
Figure 4. Median age of people tested for HIV and diagnosed with HIV, Victoria, 1996 to 2004, by sex

The overall median age of males diagnosed with HIV was 35.2 years, compared to 31.5 for females. Although the median age of females was highly variable due to small numbers the annual median age of males was consistently higher than for females, except for 1997 (Figure 4).

Testing by laboratory type

In the 1980s all HIV serological tests were performed by four main public laboratories. Since 1991 the proportion of testing done by private laboratories has increased substantially, with private laboratories conducting 76 per cent of all HIV tests in 2004 in Victoria (Figure 5).

Figure 5. Proportion of tests performed by different categories of laboratories Victoria, 1991 to 2004



VIDRL – State Reference Laboratory.

PUBLIC – Public Pathology Laboratories and Public Hospital Laboratories.

PRIVATE – Private Pathology Laboratories.

OTHER includes military and IVF laboratories.

MDU – Microbiological Diagnostic Unit.

Discussion

This analysis has shown that the number of HIV tests performed in Victoria has increased markedly since the implementation of HIV testing in 1984. The male to female ratio of tests performed has remained approximately equal overall, although in recent years the proportion of tests among females has increased. Similar to trends observed in HIV surveillance, the HIV diagnosis rate calculated using testing data as a denominator decreased over time but showed a marked increase in 2000, an increase which has not returned to the lower rate of 98.9 per 100,000 tests observed in 1999. The majority of HIV tests are now performed by private laboratories.

HIV testing data also allows for assessment of the extent of HIV testing in a population. Testing is an important public health strategy; it provides clinicians with an opportunity to offer information and education to patients to reduce their risk.⁹ Positive HIV results can also be followed up with partner notification and contact tracing. Early detection can also allow individuals to take action to prevent further transmission and ensures timely introduction of treatment, which is known to relate to better clinical outcomes.¹⁰ Antenatal HIV screening is important as the diagnosis allows for interventions to be implemented during pregnancy, labour and post-partum which reduce the risk of mother-to-child transmission.¹¹

This analysis has shown a marked increase in HIV testing among females which most likely relates to increased incorporation of HIV into standard antenatal screening in Australia. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists recommends universal HIV testing at the time of the first antenatal visit.¹¹ The estimated proportion of pregnant women screened for HIV in Australia has increased from around 20 per cent in 1991–92,¹² to 33 per cent in 1999.¹³

The total number of HIV tests performed annually among males has also increased substantially over the past two decades, which is a good public health outcome considering the major risk group for HIV in Victoria is MSM.¹ The testing guidelines for HIV/STIs for MSM released by the Royal Australasian College of Physicians, recommend annual HIV testing.¹⁴ However, it is possible that a large proportion of testing among males was due to testing among low risk groups as part of other screening (i.e. insurance screening) rather than among the high risk group MSM. Unfortunately, the high proportion of missing data on risk group (personal category) means that testing patterns and diagnosis rates cannot be determined specifically for MSM from HIV testing surveillance.

HIV testing data also allows for the assessment of the impact of any changes in testing on the current Victorian HIV epidemiology as passive HIV surveillance trends over time may also be influenced by testing behaviour or testing campaigns that encourage testing. Although the diagnosis rates trends were similar to passive surveillance diagnoses trends, suggesting that the increases in diagnoses observed between 1999 and 2002 were unlikely to have been influenced by marked increases in HIV testing, without information specifically about MSM the HIV data currently collected is probably not sensitive enough to assess this accurately.

This analysis was limited by the quality of the data reported. Although data completion for date of birth, sex and total test numbers were high, many testing

laboratories sent incomplete data on other variables, often because these data are not recorded on the test request form or because the laboratory does not have the capacity to extract the information efficiently. The standard pathology request forms used for requesting tests from private laboratories do not ask for information on risk group or reason for test, this hinders data collection given that the majority of tests are now conducted by private laboratories. Furthermore, at the time of analysis, private laboratories were not provided with funding to conduct HIV serology tests and therefore had little motivation to collect the additional data. The shift in HIV testing from public to private laboratories means that data quality has become poorer and data completeness has decreased over time. The lack of complete information, especially on risk category and reason for test, reduces the utility of HIV testing surveillance for interpreting trends based on denominator data. One option to improve completeness of the epidemiological information could be to encourage clinicians to use the HIV test request form and to fund laboratories for the data extraction. However this option probably isn't sustainable.

The incorporation of sentinel surveillance data within subgroups at high risk, i.e. MSM, to complement total test numbers may be a better solution for future analysis of HIV testing patterns and diagnosis rates within specific groups in the community.¹⁵ With funding from DHS, the Burnet Institute in collaboration with DHS, VIDRL and the Melbourne Sexual Health Centre implemented a linked HIV sentinel surveillance system in early 2006 which will be conducted over three years. This system involves collection of demographic data, HIV testing history, and sexual behaviour information by clinicians using a questionnaire from all clients undergoing HIV testing at selected clinics with a high case load of MSM. This information will be linked to the HIV test result. The system will enable us to determine the total HIV tests conducted among MSM seen at the clinics and the proportion testing positive. These data will be used to gain a more comprehensive picture of at risk people being tested and the impact of testing on HIV epidemiology.

The data presented in this paper have shown that HIV testing has increased substantially in the past two decades in Victoria, in both males and females with more testing occurring among female in recent years. Collection of HIV data is an important element of overall HIV surveillance, however in this system poor data quality has limited the usefulness of the system. New strategies have been implemented to overcome some of these limitations.

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Erratum

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