

Investment in HIV prevention works: a natural experiment

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In this, the final article in this issue, we outline what we consider to be the reasons behind the continuing success of HIV control among men who have sex with men (MSM) in New South Wales (NSW). It is not an analysis of the failure in other Australian states, which have simply seen what almost all other developed countries are experiencing.¹

The principal reason for devoting an entire issue of *Sexual Health* to this topic was the hypothesis that there may be a basis for the stability in the rate of HIV notifications in NSW compared with the increases elsewhere. If the difference was due to a modifiable factor, and we could identify what was responsible for this, then the implications for future HIV control would be significant. We acknowledge that the analyses presented here are ecological and therefore are subject to all the biases associated with inferring any causal relationship. However, we consider these findings to be important for two reasons: first, the magnitude of the difference is large (109% increase in HIV in Victoria compared with a 4% decrease in NSW) and second, the experience in Australia is, as far as we can ascertain, unique, and may provide valuable guidance about what works in practice for effective control of HIV among MSM in developed-country settings.

Are the differences in trends in the notification of HIV diagnoses between Australian states true differences in the incidence of infection? There are four analyses, presented in this edition, which support our hypothesis that these differences do reflect a real difference in HIV incidence.^{2–4} First, the mean CD4 count and its trend over time of newly diagnosed cases was similar in each state.² This suggests that HIV was diagnosed at a similar stage, albeit at an increasingly early stage of infection, in each state.² Second, HIV testing rates were high among MSM, with only small differences between the states.³ Third, trends in the number of cases of newly diagnosed HIV infection, defined as someone who had a seroconversion illness or a negative HIV test in the past 12 months, showed a similar pattern to the trend in all new HIV diagnoses.² Fourth, changes in the prevalence of HIV between 1998 and 2006 through cross-sectional surveys are consistent with the notification data,^{4,5} with a substantial decline in the age-standardised HIV prevalence in

Sydney (from 14.2 to 9.0%, $P < 0.001$), a small decline in Brisbane (from 8.5 to 6.9%, $P = 0.012$), and no change in Melbourne (from 8.4 to 8.1%, $P = 0.85$). The declines in prevalence in Sydney were particularly marked in young men (20–29 years of age) and fell from 7.7% in 1998 to 2.1% in 2006.⁵ A change in prevalence is thought to be a more accurate marker of incidence in younger age groups. Further support for the hypothesis that the differences in rates of HIV diagnoses reflect differences in incidence comes from a recently published analysis.⁶ In this analysis, rates of new HIV diagnoses were reported as the number of new diagnoses per 100 individuals living with HIV. The rationale for this analysis was that the strongest factor driving new HIV infections is the number of individuals living with HIV.⁷ Marrone *et al.* showed that between 1998 and 2006 notifications per 100 people living with HIV rose from 5.3 to 5.8 in Victoria, remained stable at 7.8 in Queensland but fell from 5.8 to 4.5 in NSW.⁶ Taken together, these analyses provide strong evidence that there has been a divergence in rates of HIV infections between Australian states. NSW appears to be the only location in Australia, and unique internationally,¹ in avoiding a substantial upswing in rates of HIV infection in MSM.

If NSW stands out as having avoided a resurgent HIV epidemic in MSM, what might explain this success? There are a large number of factors that need to be considered, including differences in sexual practices and condom use, rates of sexually transmissible infections (STI), uptake of HIV treatment among MSM, use of HIV treatment for primary HIV infection, disclosure of HIV status, HIV testing rates that affect the efficacy of serosorting and other risk-reducing strategies that don't involve condoms. Herpes-suppressive treatment may also prevent transmission of HIV from HIV-positive individuals. Finally, there are factors that may influence each of these, such as public investment and expenditure in prevention programs.

There are convincing data to indicate that since 2000 patterns of sexual risk behaviour in Australia mirror the patterns of notification of HIV diagnosis.⁸ In the 1990s, levels of risk behaviour, as measured by the proportion of men with casual

partners who reported unprotected anal intercourse with those partners, was much higher in Sydney than elsewhere.⁸ However, since 2001, risk behaviour has declined in NSW, whereas it has increased in Victoria and Queensland. In addition to the decreasing trend in unprotected anal intercourse with casual partners (UAIC) reported in NSW, it appears that when UAIC occurs, it is more likely to involve serosorting, especially in NSW.⁸ Knowing one's HIV status is a prerequisite if serosorting is to be effective in reducing HIV transmission. The number of MSM who reported not knowing their HIV status has been lower every year in NSW than for the corresponding year in either Victoria or Queensland.⁸ For example in the Gay Community Periodic Surveys, in 2006 NSW, 3.7% of MSM reported not knowing their HIV status compared with 5.4% in both Victoria and Queensland.⁸ Furthermore, the proportion of MSM who report never disclosing their HIV status to casual partners with whom they had UAIC has been substantially lower in NSW than Victoria or Queensland for every year since 2001. These figures would suggest that serodiscordant casual sex is more common in Victoria and Queensland than in NSW.

In addition to risk behaviours, it is important to consider whether trends in the prevalence of HIV transmission cofactors, such as the presence of STI and levels of HIV viral load, differ between states. Both of these factors have been examined in this issue.^{9,10}

In Australia, with the exception of HIV, there is no systematic collection of data on STI rates in homosexual men. Middleton and others provide an extensive review that includes the analysis of routine surveillance data, laboratory reports of STI, information on STI testing rates in MSM, and published and unpublished reports of prevalence surveys in MSM.⁹ The authors report increasing rates of gonorrhoea, chlamydia and infectious syphilis in homosexual men. In contrast to the patterns seen for HIV, there was no evidence that increases were of a smaller magnitude in NSW.⁹ Testing rates for STI reported in the periodic surveys were higher in NSW than in either Victoria or Queensland and in 2006 the reported rates for any STI testing were 69, 62, and 61% respectively.⁹ In Australia, genital herpes is not a notifiable infectious disease. There are insufficient data on whether herpes infections are more common in one state than another, although for HIV-negative men, the seroprevalence of herpes simplex virus-2 was ~25% in a clinic-based survey in Melbourne and a community-based cohort in Sydney.^{11,12} There is substantial interest in the possible role of herpes-suppression treatment in HIV prevention although randomised studies indicate that it does not protect HIV-negative individuals from acquisition (http://www.hptn.org/research_studies/HPTN039.asp; accessed 1 March 2008). In Australia, herpes treatment is subsidised by the federal government but the HIV status of those prescribed treatment is not recorded, so it is not possible to determine from prescribing data the proportion of individuals with HIV who receive suppressive treatment for herpes. However, in this issue, investigators report on a survey sent to members of the Australasian Society for HIV Medicine, an organisation to which most prescribers of HIV medication belong.¹³ Although there were minor differences between states there was no consistent trend to indicate that herpes treatment was used more frequently in one state than another for HIV-positive individuals.¹³

Antiretroviral treatment for HIV dramatically lowers viral load and thus is likely to reduce HIV transmission. Therefore, if antiretroviral treatment was more widely used in one state than another, it could potentially influence HIV transmission rates. Two studies have looked at this in this issue.^{10,13} Glenday *et al.* analysed the Commonwealth data on antiretroviral drug treatment and reported on the data from several cross-sectional surveys and a cohort of 2066 individuals taking HIV treatment called the Australian Observational Data Base.¹³ All of these found that similar proportions of HIV-positive MSM were on antiretroviral therapy (ART) and had undetectable viral loads in all three states.^{10,13} An earlier study assessing the Commonwealth antiretroviral data support these findings.⁶ It is therefore very unlikely that a difference in ART is contributing to the differences in HIV notifications.

Two studies reported in this issue provide evidence about the use of ART in primary HIV infection.^{10,13} The first was the previously mentioned survey of medical members of the Australasian Society for HIV Medicine. In this study conducted in 2007, a low proportion of prescribers, 11% in NSW and 6% in other states, indicated that they would always or usually prescribe ART for primary HIV infection.¹³ In another paper presented in this issue the authors enrolled 159 men with primary HIV infection in NSW and Victoria and found that 91% (118/130) from NSW were treated in the first year of diagnosis compared with only 66% (15/29) in Victoria.¹⁰ The study noted a very significant decline in treatment over time for those in NSW. Notwithstanding the limitations of these data, the higher level of early treatment of primary HIV infection may have reduced HIV transmission somewhat in NSW. However, the marked recent decline in the treatment of primary HIV infection, at a time when HIV notifications were stable in NSW, suggests that it is not a driving factor behind the interstate differences.

Access to health services can significantly affect the prevalence of STI.¹⁴ Pell *et al.* reported on the number of sexual health services and general practitioners who provide services directed toward MSM (GP MSM).¹⁵ They found that NSW had the lowest number of MSM per sexual health clinic in the state (1780) compared with Queensland (2200) and Victoria (5000) but that the numbers of MSM per GP were more similar in all three states (1500, 1600 and 2500, respectively). These data suggest that access to sexual health services may be greater in NSW although a detailed analysis involving the number of clients seen at each service was not provided.

Hoare *et al.* have modelled the HIV epidemic in NSW, Victoria and Queensland.¹⁶ The model was not able to explain the rises in HIV notifications on the basis of changing sexual behaviour although importantly the model did not include serosorting as a variable, which has been reported to differ between states.⁸ The model did highlight the critical importance of controlling the prevalence of other STI and increasing condom use if HIV notifications are to fall in the future. Interestingly, the model did find that the treatment of primary HIV infection may play an important role in predicting HIV notifications.¹⁶

A recent internet-based study of the gay community involving 5476 participants from all states and territories of

Australia examined the connectedness of gay men to their communities.¹⁷ There was clear evidence that NSW MSM reported stronger community connectedness than their counterparts in Victoria and Queensland. There were also state differences in gay men's contact with the HIV epidemic as measured by knowing HIV-positive people and having contact with HIV or AIDS organisations. There was some evidence that the degree to which HIV organisations embraced wider gay and lesbian health and social issues also differed by state and provided 'highways' for HIV-prevention messages to be widely disseminated.

The final paper by Bernard *et al.* addressed the investment in HIV prevention over the period during which HIV notification rates stabilised in NSW but rose in other states.¹⁸ The paper suggested that the quality of the relationship between government and community sectors was better in NSW than in either Victoria or Queensland. Around the mid 1990s, there was a substantial disinvestment in HIV prevention in Victoria and Queensland, whereas spending levels were maintained in NSW. Recently, there has been substantially higher investment in social marketing campaigns (\$545 000, \$15 500 and \$45 000 in NSW, Victoria and Queensland for 2005–06) and full-time equivalent positions specifically dedicated to HIV- and STI-prevention work with gay and other homosexually active men (29, 8 and 15 in the three states, respectively, for 2005–06) for the three states. In several meetings held to discuss the reasons behind the changes in HIV notifications there was agreement that 'relative lack of investment by states other than NSW' and higher per capita investment were a contributing factor to NSW stable rates of infections among gay men.

Collectively the papers presented in this issue add substantially to our understanding of what may be responsible for the differences in HIV notifications between NSW and other states. In many cases the studies were not designed specifically to answer this question and hence all have substantial limitations usually associated with surveillance data, different sampling methods, subgroup analyses and small samples sizes. Nevertheless, Australia is uniquely positioned to undertake an analysis such as this. It has national surveillance data on HIV diagnoses since the late 1980s and newly acquired HIV since the early 1990s. There are comprehensive behavioural surveillance data in MSM available since 1996 in Sydney and 1998 elsewhere, including data on risk behaviour, and on receipt of ART and viral load in HIV-positive men.¹⁹ Unfortunately, there are currently no nationally available data on STI in homosexual men, and the collection of such data should be a priority.

Finally, Griew gives advice on the implications of these findings for future policy directions.²⁰ He recommends strengthening the relationships between government, community, clinicians and researchers that have worked particularly well in NSW. He suggests that higher rates of HIV disclosure in NSW among MSM who decide not to use condoms between casual partners could be expanded in other states by the respective AIDS councils. He suggests that introducing the detuned enzyme-linked immunosorbent assay routinely for surveillance would be inexpensive but would

substantially improve our understanding of recently acquired HIV infection.

This issue has concentrated primarily on MSM, primarily because the success of Australia's HIV-control program among heterosexuals has meant that HIV infection among heterosexuals remains well controlled. However, the paper by Coombs *et al.* from Western Australia reported a doubling in HIV notifications in 2005–06 among non-Aboriginal men of whom 85% acquired their infection from heterosexual sex in Asia.²¹

The data presented in this issue paint a coherent picture of a natural experiment in HIV prevention in Australia. Since the mid-1990s there has been continuing, high-level and coordinated investment in HIV prevention in NSW compared with a disinvestment in other Australian jurisdictions.¹⁸ This has led to increasing HIV risk behaviour everywhere except NSW, and a stabilised or declining HIV epidemic in NSW and a rapidly increasing epidemic elsewhere.² If NSW had seen a similar proportional increase to Victoria since 1999 it would have had 706 new HIV diagnoses in men in 2006: in fact it had 325. If it had seen an identical year-on-year proportional increase to Victoria, it would have seen an additional 1536 new HIV diagnoses. As it has been estimated that NSW spends about \$6 million a year more on HIV prevention than Victoria, this suggests that between 1999 and 2006 NSW the cost of each prevented case of HIV infection was only \$A31 250.¹⁸ Investment in HIV prevention, in the Australian context, appears to be extraordinarily cost effective. The results of the process reflected in this issue are already leading to reinvestment in HIV prevention in Australia. It is hoped that this presentation can help to reinvigorate the HIV response in similar epidemics internationally.

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