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# Thirty years of condom-based HIV prevention by gay men in New Zealand

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## ABSTRACT

Three decades after the first government-funded HIV prevention campaign in 1985, gay and bisexual men (GBM) remain the population most at risk of infection in New Zealand. We review the major determinants of the elevated HIV risk for GBM, describe New Zealand's prevention response over the first 30 years, and summarise the public health record.

HIV incidence among GBM is driven by the heightened biological efficiency of HIV transmission during unprotected anal intercourse, dense sexual partnering networks, and endemic HIV prevalence. Responses in New Zealand have emphasised evidence-based primary prevention by condom use, which were implemented in communities and supported by comprehensive public health action. New Zealand has a good international HIV prevention record among GBM, however HIV diagnosis rates are now higher than they were during the epidemic nadir of the late 1990s. Lessons from the first three decades must underpin future HIV control efforts.

**H**uman Immunodeficiency Virus (HIV) is a dangerous and tenacious pathogen which is responsible for one of the worst pandemics in recorded human history. Globally, 37 million people are living with diagnosed HIV infection, 40 million have died from AIDS-related illnesses, and 2 million were newly infected in 2014.<sup>1</sup> While it is true that anyone can be infected by HIV, the full impact has been uneven, with some populations bearing a disproportionate burden. In particular, HIV has shown itself to be extremely well adapted to sexual transmission between gay men.

New Zealand's response to HIV in the 30 years since the first government-funded prevention campaign in August, 1985, has been effective, and we have a good international record.<sup>2</sup> Among gay, bisexual and other men who have sex with men (GBM), this has been achieved by a condom-based primary prevention approach delivered through communities, supported by the creation of enabling environments, and implemented in partnership with clinical services. Advances in antiretroviral treatment have further extended HIV prevention possibilities. Until a vaccine is discovered—and this search is now also

three decades long and counting—condoms, testing and antiretrovirals will inevitably remain the core parts of our armamentarium against HIV because of gay men's unique nexus of vulnerabilities. As the last overview of prevention in this population was in 1996,<sup>3</sup> we review key principles behind barrier-based HIV prevention for GBM in this country to underline the importance of existing programmes and prepare the ground for future initiatives.

## Biological dimensions of HIV's threat

Universal biological properties of HIV, regardless of its host population, help explain why the world is facing this unrelenting pandemic (Table 1). Ongoing HIV spread is facilitated by its silent, asymptomatic nature for as much as ten years,<sup>4</sup> its transmission potential during intimate sexual behaviours,<sup>5</sup> and its elevated infectiousness soon after acquisition, when it is frequently unrecognised.<sup>6</sup> Subsequent to infection, a number of biological processes impacting on the immune system define HIV's threat and distinguish it from most other viral infections. These include an

**Table 1:** Properties of HIV defining its biological threat

Property of HIV	Implication
Infection is frequently asymptomatic for many years	Individuals unlikely to be aware they or their partners are infected, may unwittingly transmit virus.
Highly infectious early acute phase	Hyperinfectious in first 3 months when infection usually unidentified by testing.
Sexual transmission only possible by specific acts/behaviour	Requires mucosal exposure at certain sites with high density of receptor cells. Not spread casually so individuals can directly control exposure.
Uneven transmission probabilities	Anal intercourse most efficient, oral sex very inefficient. Transmission most likely during most intimate penetrative behaviour.
Extremely high levels of genetic variation and potential for recombination	Harder for immune system to control, major challenge for vaccine development, increased risk of developing drug resistance, and risk of superinfection with different strains.
Integrates directly into genetic material of target cells	Infection is permanent and ineradicable. In latent state, the virus is undetectable by immune system.
Preferentially infects coordinator cell type in immune system	Central component of immune system is attacked and permanently damaged.
Conceals presence so immune system does not recognise it	Immune system unable to eliminate HIV infection naturally.
Increases acquisition and transmission risk of other STIs	Synergistically enhances other STI epidemics.
Highest mortality of any viral infection other than rabies	If untreated HIV infection is almost invariably fatal.

extremely high genetic variability and capacity for recombination, leading to extensive subtype diversity, and its ability to integrate permanently into the host genome.<sup>7</sup> Over time, this results in profound immune system damage, culminating in death from opportunistic infections and cancers in the absence of timely diagnosis and treatment.

## Gay men's heightened vulnerability to HIV

No group is more heavily impacted by the sexual transmission of HIV than gay and bisexual men, in whom the first cases were identified. In every region where data are available, GBM have a higher prevalence of HIV infection than the general population.<sup>8</sup> This is seen across diverse settings, such as New York City, where the HIV case rate for GBM is 140 times higher than among heterosexual men,<sup>9</sup> to sub-Saharan Africa, where average HIV prevalence is 17.9% for GBM compared to 5% for all adults,<sup>8</sup> and in low and middle income countries where the

odds of having HIV were 19.3 times higher for GBM than the general population.<sup>10</sup> Current global estimates have HIV incidence declining for almost all populations,<sup>1</sup> with the exception of GBM in whom incidence is either static or rising.<sup>11</sup>

New Zealand GBM have also been seriously affected by this epidemic. In studies of sexual health clinic attenders, GBM are 40 times more likely to have HIV than heterosexual men and women.<sup>12</sup> Community studies in Auckland suggest that approximately 6% of sampled GBM are living with HIV, one-in-five of whom are unaware of their HIV-positive status.<sup>13</sup> For those newly diagnosed, over a third are identified late in the course of infection (CD4 count < 350, or a median of 4 years post acquisition).<sup>14</sup> Transmission of HIV within New Zealand is concentrated among GBM,<sup>15</sup> who in 2014 accounted for 80% of New Zealand's locally-transmitted epidemic, despite comprising around 2.5% of the total population. Furthermore, the number of GBM living with diagnosed HIV is growing every year and is estimated to have more than doubled

between 1999 and 2009.<sup>16</sup> In contrast to this hyperendemicity, locally-transmitted HIV in heterosexuals, people who inject drugs, and sex workers in New Zealand has remained at very low levels over more than thirty years.<sup>17</sup>

Three decades is sufficient time to be confident that this disproportionate impact is not an accident of history, but a real phenomenon requiring explanation. It is now clear that the three central reasons are the high biological efficiency of HIV transmission through receptive anal intercourse, the different sexual partnering dynamics seen in GBM communities, and the endemic HIV prevalence that drives high numbers of new infections.

### High efficiency of HIV transmission by anal intercourse

Contrary to widespread opinion,<sup>18</sup> most sexual behaviours are inefficient, implausible or impossible modes of HIV transmission. The per-contact probability of infection for different sexual acts varies substantially.<sup>5</sup> This is highest for receptive anal intercourse (RAI) without a condom, which has an 18 times higher probability of HIV transmission compared with receptive vaginal intercourse without a condom.<sup>19,20</sup> At the other end of the spectrum, oral sex has a very low to negligible probability of HIV transmission and kissing poses no risk.<sup>5</sup> The per-partnership probability for unprotected RAI—the cumulative risk from repeated acts over time—is 40%.<sup>19</sup> These probabilities are also heterogeneous.<sup>21</sup> Amplifying factors for anal intercourse include: sexual position (receptive intercourse being substantially riskier than insertive); the early acute phase of HIV infection (when HIV viral loads are highest and transmission probability is up to 26 times greater than during chronic infection);<sup>6</sup> the presence of other sexually transmitted infections (STIs) that concentrate HIV in semen or immune cells at the site of infection; and circumcision status for the insertive partner.<sup>5</sup> For practical purposes, unprotected receptive and insertive anal intercourse are therefore the only sexual acts conferring a meaningful HIV risk for GBM, and likely account for >99% of sexually-acquired HIV in this population. Furthermore, the excess HIV risk attributable to anal intercourse was highlighted by a recent study: all other

things being equal, HIV incidence for GBM would be reduced by 80–98% if the relatively high per-contact HIV transmission probability of condomless RAI was mathematically modeled to be the same as that for condomless vaginal intercourse.<sup>8</sup>

Although early in the epidemic the prevailing wisdom held that physical trauma and blood exposure were the main causes of HIV transmission through anal intercourse, the biological processes behind the elevated risk of RAI are now more clearly understood. Like all viruses, HIV must first come into contact with the specific target cells that it is genetically programmed to infect. For HIV, three main receptors exist (CD4+, CXCR4 and CCR5); CD4+ and one other receptor is required for infection to occur.<sup>22</sup> These receptors are found primarily on helper CD4+ cells in the immune system. The largest number of immune cells (40–65% or more) occur in gut-associated lymphatic tissue (GALT) and the thin anorectal mucosal surface is therefore highly susceptible to HIV infection.<sup>23</sup> High HIV viral loads are seen in the gut mucosa following infection, more than in either blood or semen.<sup>24</sup> Significant damage to the mucosal immune system in the gut persists, even in the presence of long-term antiretroviral treatment (ART).<sup>25,26</sup>

Despite the transmission risks of unprotected RAI, anal intercourse itself is an important sexual activity for the majority of gay and bisexual men, just as non-reproductive penile-vaginal intercourse is a highly valued sexual behaviour for most heterosexual men and women. In New Zealand, over 90% of GBM sampled in community surveys had engaged in anal intercourse at least once in their lifetime.<sup>27</sup> Rates of recent practice with casual sex partners have been rising over the last decade, from 68% in 2002 to 76% in 2011.<sup>28</sup> Half (52%) reported that their first anal intercourse occurred by the age of 20; by age 30 this was 84%.<sup>27</sup> Sexual role versatility is common, with 17% being exclusively receptive in anal intercourse, 30% being exclusively insertive, and 53% reporting both insertive and receptive anal intercourse with casual partners in the 6 months prior to survey.<sup>27</sup> GBM's unique ability for sexual role reversal (being receptive then insertive, which is not possible in hetero-

sexual intercourse) is significant, as it places an individual at high-risk of acquisition and then subsequently of HIV transmission, accelerating spread across the gay male population.

### Sexual networks in gay and bisexual male communities

It takes at least two people to engage in anal intercourse. Consequently, understanding the acquisition and transmission of STIs like HIV requires the study of partnerships, not just individual acts. Moreover, the spread of infection beyond a few isolated cases is shaped by the aggregated and dynamic pattern of these partnerships across a community, which connects infected with susceptible individuals, and defines the potential for ongoing chains of transmission over time. It is this density of sexual connectivity that influences a given community's overall incidence and prevalence once HIV has been introduced.<sup>29</sup> Likewise, at a personal level, this density situates someone close to or further away from HIV transmission pathways, and in doing so determines the probability that the next sexual partner will have undiagnosed infection. This macro phenomenon is often referred to as a sexual network (its social equivalent popularised in the concept of 'six degrees of separation').<sup>30</sup>

Community studies in New Zealand over thirty years indicate that the sexual network of gay and bisexual men differs markedly from that of the heterosexual population. The distribution of sexual partner numbers is right-skewed with a long tail, with a significant proportion reporting high partner numbers (around 10% of sampled GBM report more than 20 partners in the last 6 months).<sup>27</sup> Rapid partner turnover, short-gap lengths between partners, and sexual mixing between individuals in this 'core group' can create reservoirs of infection: 19.6% of this group reported an STI in the last year, compared to 4.6% of those reporting one partner.<sup>31</sup> Incursion of HIV and STIs into the core group will be even greater if condom use is inconsistent, affecting risk not only for themselves, but also for GBM with more moderate rates of partner change but who are sexually linked to them. Around half of sampled GBM report a current regular sexual partner at the time of survey (either a boyfriend/

husband or friend they have sex with), and over two-thirds report a casual partner in the preceding 6 months.<sup>27</sup> Although many GBM are in monogamous relationships, this overlap leads to approximately half of those in longer-term sexual relationships engaging in sexually non-exclusive behaviour (much of this being mutually agreed). From the early 2000s, internet dating, and more recently geo-location apps, have transformed the sexual marketplace for everyone, but especially for 'invisible' minority populations such as GBM, with 53.4% reporting an active profile at the time of survey in 2014, and 63.1% having ever acquired a sexual partner online.<sup>32</sup> These apps have enlarged the pool of potential sexual contacts, and improved the efficiency of partner acquisition, both in terms of its immediacy and the ability to match sexual preferences.<sup>33</sup> Furthermore, GBM surveyed on dating sites report lower testing and condom use and less favourable attitudes to safe sex.<sup>34</sup> While nationally representative surveys overseas confirm that heterosexuals also report many of these sexual behaviours, GBM populations are on average far more likely to do so.<sup>35</sup>

### Combined factors create conditions for explosive HIV epidemics

In the absence of effective interventions, viral properties (the high HIV transmission efficiency of unprotected RAI, the high infectiousness of HIV in the early acute phase, asymptomatic infection, and permanent duration of infectivity in absence of cure) combine with behavioural properties (the frequency of anal intercourse, sexual role versatility, and dense sexual networks) to produce explosive HIV epidemics in GBM populations. As epidemics mature over time, the high underlying prevalence of HIV infection in GBM communities propels high ongoing incidence. Furthermore, in many societies, social, cultural and health system factors, such as homophobia and heterosexism, continue to hinder interventions among GBM—such as the provision of relevant safe sex advice and delivery of timely HIV and STI screening.<sup>36</sup> Even when these services are provided, the sequelae of living as a minority—such as social isolation, poorer mental health and

**Table 2:** Twenty reasons to establish and maintain condom use for anal sex by gay and bisexual men

Effective	Condoms prevent HIV transmission at both the individual and community level extremely successfully.
Simple	Straightforward to deploy: acquire the condom, open the packet, put it on and add lubricant.
Verifiable	Both partners can tell if they are being used, and effectiveness does not depend on accurate communication.
Safe	No harmful health side effects or capacity to promote genetic resistance to HIV or STIs.
Controllable	Easily manageable by couples on their own without any professional assistance or follow-up.
Sustainable	Gay men can maintain consistent condom use for many years, up to three decades so far in New Zealand.
Inexpensive	Affordable for individuals and governments, and usually provided free of charge in community venues.
Marketable	Tangible product that can be easily visualised, promoted and distributed.
Empowering	Enables gay men to have the sex life they want and minimises the need to alter sexual repertoire.
Acceptable	Most New Zealand gay and bisexual men are using them, especially with casual partners.
Accessible	Condoms can be made readily available to everyone without prescription or other restrictions.
Comprehensive	An impermeable physical barrier to HIV that also offers substantial protection against other STIs during anal sex.
Ethical	Use demonstrates mutual care for sexual partners and commitment to gay community health.
Scaleable	Can be far more easily rolled out as a population-wide prevention programme than any other available option.
Universal	Effectiveness does not depend on knowing personal HIV and STI status, or require disclosure to sexual partners.
Reliable	Quality control is excellent and they fail extremely rarely when stored and used correctly.
Established	Condom use has been actively promoted to gay men in New Zealand since 1987 and remains widely supported here.
Complementary	Use does not in any way limit the effectiveness of clinic-based prevention programmes that rely on antiretroviral therapy.
Timely	Condoms are used only during anal intercourse when HIV and STI transmission risk is highest.
Convenient	Can easily be taken across borders and carried in pockets.

substance use—can impact on gay men's ability to maintain HIV risk reduction practices.

The speed and scale of HIV's spread in GBM populations given these conditions is well-documented. Retrospective analysis of a San Francisco GBM cohort identified that 28% were infected by 1981, before AIDS was described, and incidence in 1982 alone was an extraordinary 20%.<sup>37</sup> Of those

with over 50 partners in the last 2 years, HIV prevalence was 71%.<sup>38</sup> In Scandinavia, the estimated reproductive number of HIV among GBM was 15 secondary cases during 1981–2 prior to control efforts.<sup>39</sup> Phylogenetic analysis of HIV diagnoses among GBM in the UK revealed that 29% of HIV infections occurred within large clusters and of these, 20% occurred within 6 months of the index case.<sup>40</sup> Contact tracing

of a young, newly-infected gay male in Wales uncovered a sexual network of 123 individuals and 15 new undiagnosed HIV cases.<sup>41</sup> US projections suggest that even relatively small annual incidence rates of 2.4% can result in 40% of GBM being infected by age 40.<sup>42</sup> Similar statistics are currently being observed in nascent gay communities in Thailand,<sup>43</sup> China,<sup>44</sup> and the Philippines,<sup>45</sup> illustrating that the same trajectory of HIV and STI transmission could be repeated now if the lessons of the last 30 years are forgotten.

## The prevention response in New Zealand

While GBM remain disproportionately affected by HIV in New Zealand, we have forestalled the worst scenarios described above. Early, comprehensive and sustained interventions based on condom promotion have been central to New Zealand's favourable record and are summarised below.

### The early response

By the middle of 1987, the scientific evidence indicated that only anal intercourse—not other sexual activities or partner numbers, per se—was the primary cause of HIV infection.<sup>38</sup> Evidence was also accumulating that condoms, if used correctly and consistently, worked very well to prevent the sexual transmission of HIV.<sup>46</sup> These twin developments enabled the New Zealand AIDS Foundation (NZAF) to focus on promoting condom use for anal intercourse as its central prevention strategy from that point. This had several profound implications for control. First, it offered gay men agency over their risk of acquisition and transmission. Second, it required minimal alterations to gay men's sexual repertoire, making the intervention acceptable and sustainable. Third, it provided a single and easily communicated target for community-led public health efforts. Fourth, it was applicable to all GBM having anal intercourse, regardless of HIV or relationship status, simplifying implementation.<sup>47</sup>

Since then, condoms have proven to be an extremely effective sexual health intervention because they respond to all

the key drivers of HIV spread among gay men previously described (Table 2). As the recent Canadian consensus statement on HIV transmission notes:

*“[c]ondoms are a cornerstone of HIV prevention. Latex and polyurethane condoms act as an impermeable physical barrier through which HIV cannot pass. When used correctly and no breakage occurs, condoms are 100% effective at stopping the transmission of HIV because they prevent contact between HIV-containing body fluids and the target cells of an HIV-negative individual.”<sup>48</sup>*

The centrality of condom use has been reiterated in a 2015 UNFPA, WHO and UNAIDS position statement, highlighting that condoms have averted approximately 50 million new HIV infections globally since the start of the epidemic.<sup>49</sup>

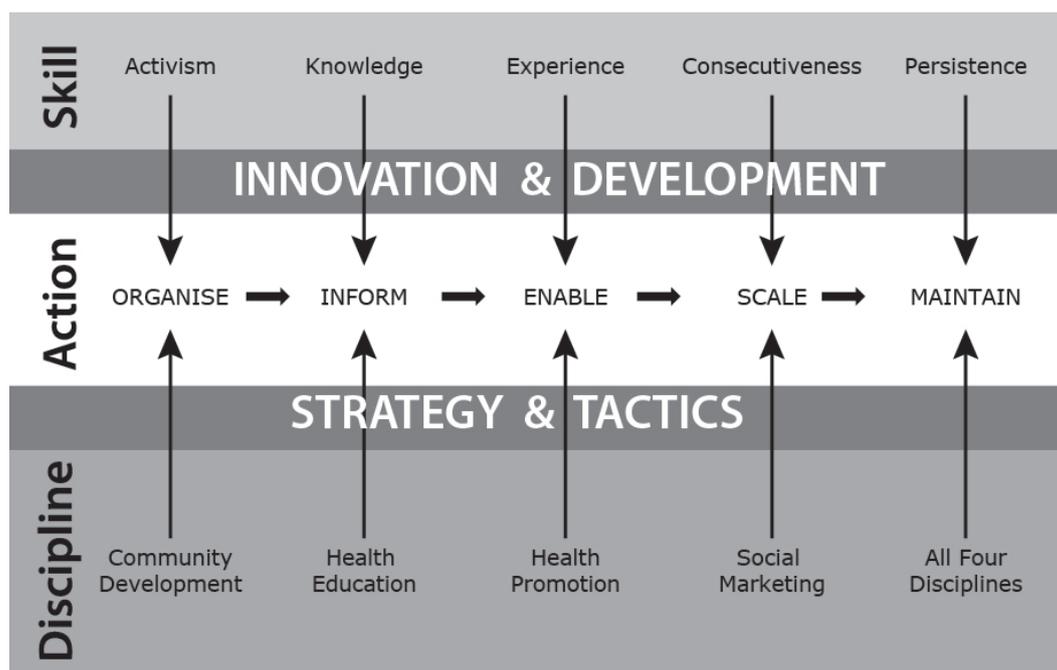
### Health promotion

Over the following decade, substantial effort was put into developing a health promotion-based framework for condom uptake, with the aim of removing obstacles to condom use by gay men.<sup>50</sup> This utilised the five-sector action framework of the Ottawa Charter: the creation of supportive social environments; healthy public policy; developing personal skills; reorienting health services; and promoting community action.<sup>51</sup> Examples included countering anti-gay prejudice, reforming the Human Rights Act 1993, delivering public safe sex campaigns, providing community-based HIV testing and condom distribution initiatives, and establishing the HERO gay community development project. The subsequent success of these initiatives demonstrated the fundamental importance of aligning legal, social, cultural, health and peer incentives towards the public health intervention of condom use by gay men. Health promotion advocacy like this has continued to the present day, with legal decisions such as NZ Police vs Dalley illustrating the importance of the law underscoring rather than undermining public health goals.<sup>52</sup>

### Peer-led and community-based responses

Confronting HIV successfully also necessitated a new approach to public health.

**Figure 1:** Strategic approach guiding New Zealand's condom-focused HIV prevention response among gay and bisexual men in the last 30 years



Lacking the usual coercive levers (raising prices, regulating supply or imposing legal sanctions), the principal tool for HIV prevention has been persuading gay and bisexual men to voluntarily adopt risk-reduction behaviours. Although heterosexual allies were, and continue to be vital supporters, it was clear when HIV first appeared that calls to change behaviour as fundamental as intimate sexual practices had to be championed by gay men themselves.<sup>47</sup> Personal access to community institutions and connections with community gatekeepers were required for credible public health advocacy. Peer-based prevention became the principal delivery model, mirroring the informal efforts of gay activists early on.

Similarly, sex between men had been illegal until 1986 and discrimination on the grounds of sexual orientation legal until 1993, leaving many gay men with reasons to be distrustful of government institutions.<sup>50</sup> Governments themselves were often not comfortable developing the sexualised HIV prevention resources that were most effective. This led to the decision that peer-led responses should be community-based and held at 'arms-length' from officials in order to foster trust and encourage engagement with prevention services.<sup>3</sup> Funding an independent NGO, such as NZAF, to deliver the majority of HIV-prevention services for GBM has been an important feature of peer-led,

community-based initiatives, simultaneously enabling a professionalised response that retained community involvement and accountabilities.

### Increasingly comprehensive approaches

Taking a broad synopsis of the historical record, Figure 1 encapsulates the strategic approach taken to HIV prevention in New Zealand, the skills that were used, and the health intervention disciplines that contributed. Early responses mobilised HIV awareness in gay communities, utilised scientific evidence to inform GBM about HIV and how to avoid it, and advocated for structural reforms to enable GBM to uptake health-seeking behaviours. These agendas were largely executed by a community development, a health education, and a health promotion approach respectively. Aspects of all this work continue to be necessary as new generations of GBM become sexually active, especially as mainstream media interest in HIV and safe sex has waned. Most recently, condom promotion efforts have intensified using social marketing approaches to achieve more effective scale and frequency.<sup>53</sup> This has been a response to increasing diversification of social media, and competition involving less effective alternative approaches to HIV prevention (such as expecting a sexual partner to know and disclose their HIV positive status).

The overall public health goal of these efforts over the last three decades has been to use strategy<sup>51,54</sup> to establish a robust social movement supporting condom use for anal intercourse. This work has direct parallels to the promotion of immunisation against other communicable diseases for the general population. Shared problems include the requirement to maintain high intervention coverage as visible disease burden and public concern declines, and the need to counter opposition (eg, ‘anti-vaxers’ opposed to childhood immunisation and ‘barebackers’ opposed to condom use).

## Achievements

### Controlling HIV

Epidemiological analyses indicate that New Zealand’s public health record at limiting infection among GBM ranks among the best in the world. By 1997, new HIV diagnoses among GBM in New Zealand had fallen to the lowest number since the peak in 1989 (to just over 20 local infections per year), a result that was maintained until 2001.<sup>17</sup> Sharp rises in new diagnoses in this country since 2000, four years after the provision of new antiretroviral therapies for HIV and coinciding with the emergence of internet dating, were universally recorded in GBM communities in Western Europe, the UK, US and Australia, implicating shared factors not unique to New Zealand.<sup>15</sup> A steady state in new HIV diagnoses in New Zealand from 2005 contrasted with continuing increases in many countries.

### Condom uptake

Equally, efforts to raise and then maintain condom use for anal intercourse by GBM in New Zealand rate as one of this country’s outstanding public health successes. Retrospective research suggests that condom use at first anal intercourse rose from 28% in 1985 to 83% in 2005.<sup>27</sup> Behavioural surveillance conducted in community settings indicates that frequent condom use (“always or almost always”) with casual male sexual partners is approximately 85% in the 6 months prior to survey and has been maintained at that level since at least 2002,<sup>28</sup> albeit with a small decline in 2014. Condom use is consistently lower among regular sexual partners at around a third of GBM, reflecting the contextual nature of

safe sex, but still a significant achievement. There has even been support for condom use as a public health approach among GBM who report often not using them.<sup>55</sup> Factors associated with condom use presented elsewhere in this issue include attitudes to safe sex and exposure to condom social marketing,<sup>59</sup> emphasising the importance of ongoing public health promotion to maximise adherence.<sup>57</sup>

### Attitudes to HIV and safe sex

Strengthening gay community norms to support condom use has been a key objective in New Zealand since 1987. There is almost universal personal acceptance of condoms as an effective way to avoid HIV transmission, and most respondents also believe that other gay and bisexual men support condom use.<sup>58</sup> Thus, there is strong evidence of a culture of condom use among New Zealand gay men.<sup>58</sup> Against this is a growing minority of GBM who do not perceive HIV to be a threat because of new treatments, increasing from 20% in 2002 to 38% in 2014.<sup>32</sup> Some GBM also continue to report difficulties using condoms, approximately a third report sometimes feeling under pressure not to use a condom, and 1 in 10 report that sex isn’t always as safe as they want it to be.<sup>32</sup> In the absence of comprehensive condom promotion for the general public in New Zealand, social marketing from NZAF such as LYC (Love Your Condom) has aimed to increase peer expectations for condom use, improve access to free condoms and promote user-efficacy. Countervailing initiatives to maintain condom use will be needed as the visible consequences of HIV infection decline, as the efficacy of treatments to reduce HIV transmission and acquisition risk is promoted, and as internet pornography depicting unprotected sex becomes even more widespread.

## Conclusion

Three decades into New Zealand’s HIV epidemic, gay and bisexual men remain the population at greatest risk of infection. As in all countries, the primary biological driver of HIV transmission among GBM is unprotected anal intercourse, spread being sustained by dense sexual networks, coupled with endemic HIV prevalence. Taken together, these factors result in a high number of GBM circulating in the sexual network with undiagnosed

infection. In response, condoms—if used consistently and correctly—are extremely effective in preventing HIV transmission, because they provide an impermeable barrier to HIV during anal intercourse and their protection does not rely on up-to-date knowledge of actual infection status. New Zealand's successful HIV prevention record over many years demonstrates how valuable condom-centred programmes are if delivered at sufficient intensity and at scale, with wide, cross-sectoral buy-in and supported by enabling environments. Condoms also offer a large number of practical advantages over other prevention options, including being the only HIV intervention that simultaneously limits STI spread.

A clear understanding of HIV prevention implementation at the community coalface must underpin strategies for future HIV control. HIV diagnoses among GBM in 2014 were the highest ever recorded in New Zealand, posing urgent questions about

the need for additional interventions. New prevention options include HIV antiretrovirals taken as treatment for HIV-positive individuals, or as pre- or post-exposure prophylaxis for HIV-negative individuals, which can substantially reduce HIV transmission risks. HIV testing itself is evolving to offer more rapid and convenient access. Nonetheless, the high transmission efficiency of anal intercourse and the dense sexual networks evident among GBM have not changed, and HIV still has the same basic biological properties. Thirty years later, and in the absence of a vaccine or cure, these consistent features impose limits on the ability of testing-based interventions alone to control HIV among GBM. It is therefore essential that primary prevention barrier methods remain at the center of HIV prevention efforts for GBM, and condom use continues to be strongly supported. Our collective ability to do so will determine the success of the next phase of epidemic management.

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**Competing interests:**

Tony Hughes organised the first government-funded HIV prevention campaign delivered by NZAF in 1985. Since then, he has held the roles of Biomedical Coordinator, Research Director and Scientific Director at NZAF. His primary focus has been on utilising scientific knowledge about the HIV epidemic in gay men to sharpen strategic approaches to prevention. Dr Peter Saxton was formerly Senior Researcher at NZAF from 1997 to 2010 undertaking HIV research, policy analysis and advocacy.

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