



# Effectiveness of HIV Testing Interventions for High-Risk Populations



## Question

Which HIV testing interventions have been shown to be effective for high-risk populations?

## Key Take-Home Messages

- People infected with HIV who are unaware of their HIV status may be driving the epidemic in high-risk populations.(1) Interventions that promote the uptake of HIV testing among men who have sex with men and members of other groups at high risk have the potential to increase early diagnoses, thereby getting people into care sooner and reducing the likelihood of onward transmission.(1;2)
- HIV testing coverage is often inadequate in populations at high risk and varies widely across jurisdictions.(3) People at risk often do not comply with testing guidelines and recommendations.(4)
- A few HIV testing interventions have been shown to increase testing uptake (1;2;5-11), resulting in high seropositivity rates (between 1% and 14%) at follow-up.(2)
- Service-delivery interventions that have been shown to be effective include: offering rapid HIV testing in outreach settings (2;6;8;10;12) and implementation of “opt-out” testing policies and guidelines promoting regular HIV testing.(2;13-15)
- Community-level interventions using peer education and recruitment, social marketing, media and web-based campaigns (1;2;16-20) have shown limited success and inconclusive results; however they are more successful when targeted to very specific sub-populations. For example, one study showed that a holistic group intervention, led by trained peers, increased testing among a group of socioeconomically disadvantaged Black men who have sex with men.(11) These interventions are resource intensive and may be difficult to implement.(2)
- Intensive long-term interventions that reach a greater proportion of at-risk populations over longer timeframes are likely to have more impact on HIV testing rates.(2;21)
- Strategies to promote testing should be implemented as part of a comprehensive approach to HIV prevention.(2)

## EVIDENCE INTO ACTION

The OHTN Rapid Response Service offers HIV/AIDS programs and services in Ontario quick access to research evidence to help inform decision making, service delivery and advocacy.

In response to a question from the field, the Rapid Response Team reviews the scientific and grey literature, consults with experts, and prepares a brief fact sheet summarizing the current evidence and its implications for policy and practice.

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- Long-term impact evaluations of HIV testing interventions that measure changes in HIV or incidence of sexually transmitted infections (STIs) over time are needed to identify the most effective elements to reach high-risk populations.(1)

## The Issue and Why It's Important

**HIV testing is key to prevention and care.** Of the estimated 65,000 people in Canada living with HIV in 2008, 26% were unaware of their HIV infection.(22) The estimated proportion of people who are unaware of their infection varies by exposure category: 19% for men who have sex with men; 25% for people who use intravenous drugs; and 35% for heterosexuals.(22) The situation is similar in other high-income countries.(22) For example, the proportion of HIV-positive people without a diagnosis was estimated to be 21% in the United States in 2006, (23) 30% in the European Union in 2008 (24) and 27% in the United Kingdom in 2008. (25)

It is difficult to overestimate the importance of HIV testing, especially among high risk populations. For example, among men who have sex with men, the high prevalence of HIV infection and low awareness of HIV serostatus are key drivers of the epidemic and routine testing for HIV could reduce HIV prevalence and establish a gateway to services for this high-risk group.(3) Increasing the uptake of HIV testing among this high risk population can also reduce HIV incidence.(1;2) Knowledge of one's own and one's partners' serostatus is likely a key predictor of whether community-adopted prevention strategies, such as serosorting, confer protection or increase the risk of HIV transmission and acquisition.(3) Late HIV diagnosis is also an important predictor of morbidity and mortality: those who start treatment at a more advanced stage of HIV disease do not respond as well to treatment and remain at increased risk of dying.(2;26)

Initiatives that actively promote HIV testing have the potential to reduce unrecognized infections and late diagnoses(1) and improve health outcomes. They may also raise awareness of HIV more broadly, and help link members of high risk populations with sexual health services.(2) Most people who discover that they are HIV positive take steps to reduce the risk of transmission to others.(27) HIV testing is important not only for HIV prevention and control but for the health and well-being of the individuals who are tested.(22) People who test negative receive important information during HIV test counselling about how to reduce the risk of HIV infection, while people who test positive can be linked to care and treatment. (22) In the case of pregnant women who test positive, treatment can dramatically reduce the chances of vertical (mother to child) transmission from 35%-40% to less than 2%.(28)

**HIV testing coverage remains low.** Despite its importance, testing coverage is often inadequate in populations at high risk and varies widely across jurisdictions. (3) For example, country-specific estimates from the 2010 cross-European men who have sex with men internet survey suggest that 25 to 50% were tested for HIV during the past year,(29) compared with 60% in the Australian periodic gay community survey (30) and 77% in the US Centers for Disease Control and Prevention's national HIV behavioural surveillance report.(31) Even though a UK survey showed an upward trend in the number of men who have sex with men ever tested for HIV since 2000,(32) many are still unaware of their HIV serostatus.(33) Even in a country with relatively high testing rates, such as

Australia, the proportion of gay men who have never been tested for HIV remained largely stable between 1998 and 2010 at 13%.<sup>(4)</sup> A significant proportion of these men are sexually active, and more than half of them had unprotected anal intercourse within the six months prior to the survey.<sup>(4)</sup> Gay men of non-European backgrounds are less likely to test than men of Anglo-Australian or European origins. Young gay men are least likely to have ever had an HIV test.<sup>(4)</sup> The proportion of gay men not tested as recommended appears to increase with the distance from where they live to gay metropolitan areas where gay friendly and focused HIV services are usually located.<sup>(4)</sup>

**Testing policies vary internationally,**<sup>(2)</sup> although there is a general trend to recommending more routine testing for populations at high risk.<sup>(34)</sup> Current UK guidelines recommend offering HIV testing to men who have sex with men annually, and more frequently in cases of seroconversion symptoms or high-risk exposure(s).<sup>(35)</sup> US guidelines recommend annual screening for men who have sex with men who themselves or whose sex partners have had more than one sex partner since their most recent HIV test.<sup>(36)</sup> Australian guidelines also recommend that all men who have had any type of sex with another man in the previous year should be tested at least once per year.<sup>(37;38)</sup> “Opt-out” testing policies in sexually transmitted infection clinics are now widely implemented, as recommended by the World Health Organization and UNAIDS (2004),<sup>(39)</sup> and the UK (2006).<sup>(40)</sup>

**People at risk do not necessarily comply with testing recommendations.** Current levels of testing are not sufficient for the effective detection of early HIV infections: about 40% of HIV-negative Australian men had not been tested in the last year. Among those with more than 10 partners, 39% had not been tested within the last six months, even though guidelines recommend that this category of men who have sex with men be tested every three to six months.<sup>(4;37)</sup>

We looked at the available literature describing interventions aimed at increasing uptake of HIV testing among high risk populations. The main purpose of this review is to determine which of these interventions are most effective in increasing HIV testing rates and detecting new cases of HIV infection.

## What We Found

Using a classification of interventions similar to that used by Lorenc et al. in a recently published systematic review on this topic,<sup>(2)</sup> we identified two major types of HIV testing interventions:

1. **service-delivery interventions** include those offering different types of tests or testing protocols in outreach settings and making changes to the way in which HIV testing services are delivered in STI clinics
2. **community-level interventions** include those that involve peer education or recruitment, community based media campaigns and/or web-based educational interventions.

### Service delivery interventions:

#### *a. Type of test and testing protocol*

A randomized-controlled trial from Seattle found that, in outreach settings such as needle exchanges and bathhouse sites, traditional HIV testing with standard counseling was the least effective service model at providing clients with

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knowledge of their HIV status, while alternative HIV testing strategies (e.g. oral fluid testing, rapid testing) increased the number of clients who received their HIV test results.(10) At the needle exchange sites, more clients accepted testing (OR 2.3; P<0.001) and received results (OR 2.6; P<0.001) on days when the oral fluid test was offered compared with the traditional test. At the bathhouses, more clients accepted oral fluid testing (OR 1.6; P<0.001), but more clients overall received results on days when the rapid test was offered (OR 1.9; P=0.01).(10)

A similar pilot testing program implemented at two New York City bathhouses provided rapid HIV testing using an oral test (OraQuick Advance Rapid HIV1/2 antibody test).(6) Test results were received at the bathhouse. Of the 493 men tested, 4% were found to be HIV-positive and, of those, 40% had symptoms of acute or recent HIV infection. Because of the high rate of recent HIV infections, the authors concluded that expanded testing in these venues may be a good strategy to reduce transmissions – given the large number of sex partners reported by some bathhouse study participants and the increased likelihood of HIV transmission during the early untreated stages of the disease.(6) The program found significant disparities in the testing habits of men who have sex with men who also reported having sex with women and who had not disclosed their same-sex activities to their health care providers. Men who were married to women were less likely to have been tested for HIV infection before participating in this pilot program (P<0.001), so expanded testing in these venues may be an effective way to reach this group of men and reduce the risk of transmission to female partners.

A Los Angeles-based study examined whether offering rapid HIV testing bundled with screening for other conditions would increase HIV testing among Latino men who frequent gay bars.(12) Overall, no statistical differences were found in the number of individuals who took the HIV test or who tested HIV-positive when the HIV test was offered with screening for other conditions (i.e. alcohol problems, drug dependence, depression, syphilis, gonorrhoea, chlamydia) compared to when it was offered by itself. However, three groups of Latino men who have sex with men were more likely to test for HIV when it was bundled with other tests: those who reported having sex primarily with women, those with other risk factors that could also be tested through a bundled test approach, and those who were clients of the suburban gay bar that was farthest from a large geographical gay community.(12) The authors suggested that men who go to gay bars but who are primarily sexually active with women may not perceive themselves as being at risk for HIV, or men whose primary partners are women may have more fear or perceive more stigma in taking an HIV test and hence found the bundled tests protocol more appealing. Since the bundled protocol tested for other STIs besides HIV as well as drug dependence, individuals with any of these conditions might have been more inclined to participate in this protocol rather than one focusing exclusively on HIV. The reason the clients of an urban gay bar were less likely to choose the bundled protocol than clients of a suburban gay bar may have been due in part to the former's proximity to a gay-identified geographical area.(12)

A randomized-controlled trial offering rapid HIV testing to probationers and parolees under community supervision found that participants were significantly more likely to be tested on-site at a probation/parole office than off-site at an HIV testing clinic (P<0.001).(8) There was no difference between the two groups in terms of receiving HIV testing results. Probationers/parolees were willing to be tested on-site and, independent of testing location, were equally willing to receive their results.(8)

## **b. STI clinic service delivery**

Two studies conducted in the Netherlands examined the effects of “opt-out” policies in two STI clinics: all clients visiting the clinics received an HIV test unless they specifically requested not to have one.(13;14) Both studies found significant increases in HIV testing in both heterosexuals and men who have sex with men after the introduction of the opt-out policy. A concerning finding in both these studies was that certain groups of men who have sex with men – those who were older ( $\geq 30$  years) and those with STI-related symptoms – were more likely to opt out of testing after the introduction of the policy.(13;14) Major reasons for refusal included: fear, being in window period and having been recently tested.(13) It is interesting to note that the proportion of HIV-positive results before and after introduction of opt-out testing remained stable both among men who have sex with men (3.4% in 2007 vs. 3.7% in 2006) and among heterosexuals, (0.2% in 2007 vs. 0.3% in 2006).(14)

Another study from Australia found that the implementation of guidelines promoting regular HIV testing in an STI clinic resulted in significant increases in the proportion of men who have sex with men being tested (from 73% to 88%). (15) These guidelines recommended at least annual HIV and other STI screening of all men who report one or more male sexual partners in the preceding year.(15)

## **Community level interventions:**

### **a. Peer education and recruitment**

According to one of the theories of peer involvement in interventions - diffusion of innovation theory - certain individuals (opinion leaders) from a given population can act as behaviour change agents by disseminating information and influencing group norms in their community.(41) In this model, only a small proportion of the intervention’s total impact is achieved by direct contacts with peer educators (i.e. popular opinion leaders): subsequent conversations and interactions among gay men in the wider community help spread the changes in social and sexual norms endorsed by the peer educators. This is how wider social and sexual networks of gay men are supposed to be influenced.(18)

Several US-based studies from the 1990s demonstrated the effectiveness of peer-led interventions in reducing HIV-risk behaviours;(42-46) however, two UK studies based on these US intervention models failed to achieve the same success in terms of increased HIV testing.(17;18) One Scotland-based study examined the effects of an intervention that consisted of three elements: peer-led sexual health promotion conducted in the commercial gay scene; gay-specific genitourinary medicine services in both hospital and gay community settings; and a free telephone hotline providing sexual health information and details of local sexual health services. HIV testing uptake only increased among men who had direct contact with the intervention (OR 1.38, 95% CI 1.04 1.84,  $P=0.0243$ ). (18) However, the analysis of the interaction between location and time demonstrated no significant effects that could be attributed to the intervention and did not produce community-wide changes in sexual health behaviours.(18)

The second intervention, conducted in London’s gyms,(17) also demonstrated that peer education was not an effective tool for increasing HIV testing among gay men. While the overall percentage of men ever-tested for HIV increased from 73% at baseline to 80% at 18 months follow-up ( $P=0.002$ ), this increase occurred in both the intervention and control gyms ( $P>0.5$ ), and the intervention appeared to have no significant impact on risk behaviours. While most men (80%) thought it was useful to have peer educators in the gym to talk about risk reduction and half the men were aware of their presence, only 3% (19 out of 612) said they had spoken to a peer educator during the intervention period. Consequently, the critical mass required for diffusion was not achieved.(17;41) The authors of both

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UK studies questioned the replication and transferability of peer-led, community-level sexual health promotion for gay men across countries and time.(17;18)

*Many Men, Many Voices* (3MV), a randomized controlled trial from the US, looked at the impact of peer-led small group sessions addressing behavioural and social determinants and other factors influencing the HIV/STI risk and protective behaviours of Black men who have sex with men. It found that the intervention had no statistically significant effects on self-reported HIV testing at the three-month follow-up.(11) However, at the six-month follow-up, study participants had 81% greater odds of testing for HIV than comparison participants (OR 1.81, 95%CI 1.08 3.01, P=0.023). Linear trends across the entire study period indicated that 3MV participants had 33% greater odds of testing for HIV than comparison participants (OR 1.33, 95%CI 1.05–1.68, P=0.016).(11) The researchers found that the intervention had no statistically significant effects on testing for STIs at either the three- or six-month follow-up assessments, but the direction of changes was protective and favored the intervention group. The authors suggested that this difference may reflect barriers that many Black men who have sex with men face when accessing testing for STIs: although HIV testing is readily available free of charge in a variety of settings, STI testing requires a clinical visit during which fees may be charged. The need to disclose one's male-to-male sexual behaviour to a medical provider may also have been a barrier to STI testing.(11)

Another study from the US evaluated the effectiveness and cost-effectiveness of a health department-based peer referral program for men who have sex with men.(7) Peers recruited through a sexually transmitted disease clinic, an HIV clinic, media advertisements and collaboration with community-based organizations underwent a brief training and were paid \$20 for each person they referred to be tested for HIV, STIs and/or viral hepatitis (who also received \$20 for being tested). The cost per new HIV case identified was \$4,929 (excluding the costs of testing for viral hepatitis and other STIs) as compared to the cost per case detected through bathhouse-based testing (\$8,250) or through a testing program run by the county's largest community-based HIV testing program (\$11,481). The study concluded that peer referrals are an effective way to identify new cases of HIV among men who have sex with men. (7)

### **b. Social marketing, media, and web-based campaigns**

Social marketing is usually defined as a process that uses commercial marketing concepts and techniques to promote voluntary behaviour change. (47) Social marketing has grown in popularity and use in the public health community.(47) Social marketing campaigns are widely used to reach high proportions of large populations through existing media, such as television, radio, newspapers, magazines, billboards, posters, mobile phones and internet. (21) Several studies have evaluated the effectiveness of social marketing and media interventions on HIV testing.

An Australian social marketing campaign "Check-It-Out" designed to increase HIV and STI testing targeted three groups of men who have sex with men: young, gay community attached; non-gay community attached; and culturally and linguistically diverse.(19) Social marketing interventions tailored to each group consisted of: posters and takeaway cards in venues regularly attended by gay community members as well as advertisements in gay and lesbian publications and radio programs (for community attached); posters in trams and advertisements in regional radio and local newspapers (for non-community attached); and advertisements on radio and in publications widely distributed in four different languages (for culturally and linguistically diverse non-community). (19) Overall, the "Check it Out" campaign did not result in an increase in HIV

and STI testing among men who have sex with men. The pilot program in five clinics revealed no statistically significant changes in the numbers of HIV tests conducted per month and no differences in the proportion of men who have sex with men reporting regular annual HIV testing during the campaign (43%) or post campaign (41%). Retrospective analysis of laboratory records at four medical clinics showed no significant difference in average monthly tests for HIV, syphilis, chlamydia or gonorrhoea during the campaign period (including pre-and post-campaign). Finally, a behavioural survey revealed that over time there was no significant increase in this proportion of men who have sex with men reporting having had an HIV test in the last 12 months (approximately 60%).(19)

A study from Northern San Diego County examined the impact of Spanish-language print materials, radio ads and sponsorships, free condom distribution, community-based outreach, and promotional activities at local clubs on HIV testing rates among heterosexually identified Latino men who have sex with men and women.(20) The campaign promoted testing through a comprehensive male health exam offered by a collaborating local community clinic: a service that would allow Latino men to get tested without the stigma typically associated with HIV testing.(20) Surprisingly, lifetime rates of HIV testing for the heterosexually identified Latino men who have sex with men and women decreased significantly during the campaign (AOR 0.32; 95% CI 0.10, 0.98; P=0.046) and post-campaign compared with baseline (AOR 0.24; 95% CI 0.05, 1.06; P=0.059). There was also a significant decrease in the rates of recent HIV testing post-campaign compared to baseline (AOR 0.18; 95% CI 0.04, 0.085; P=0.03).(20) The authors suggested that the unexpected drop in lifetime and recent HIV testing rates may be due to the fact that the samples recruited in the three study phases (baseline, during the campaign and post campaign) possibly represented different subpopulations of heterosexually identified Latino men who have sex with men and women or extreme groups within the same population. These variations may also be attributable to overlap with another study in the same area that involved HIV testing: it is possible that some survey respondents had been tested as part of that study before the social marketing campaign started.(20)

Another US study in South Florida looked at changes in syphilis testing rates among men who have sex with men following an extensive social marketing campaign consisting of posters, palm cards, advertisements placed in local publications, billboards, syphilis alert banners on three web-sites, and public service announcements on radio and television.(16) Although exposure to social marketing campaign materials increased from 18% at baseline to 37% at follow-up (P<0.001), there were no significant increases in knowledge, clinic visits, or testing or treatment for syphilis over the six-month study period. Testing rates in the past 12 months actually decreased from 36% to 35%.(16) Nevertheless, Florida residents who recognized one or more of the five campaign images at follow-up were more likely than were those who were unaware of the campaign to report being tested for syphilis (44.8% vs. 28.2%; P=0.0002).(16)

A study evaluating the effectiveness of an online educational video "The Morning After" that could be accessed through a banner on a gay web-site, compared HIV testing between baseline and follow-up, but the data obtained at these two time points were not structured in the same way, and direct comparisons could not be made. However, among the 120 men who tested during the three month follow-up, an unusually high proportion (14%) reported testing HIV positive.(48)

The "gimme 5 minutes" campaign in London targeted men who have sex with men of Black and South European origin and those under the age of 25 using full-page peer images in a free tabloid newspaper distributed widely to gay-friendly venues and posters and credit card-sized leaflets distributed to all Central London gay venues.(49) There was a 4.5-fold rise (P<0.001) in testing at the campaign

47. Grier S, Bryant CA. Social marketing in public health. *Annual Review of Public Health* 2005;26:319-39.
48. Chiasson MA, Shaw FS, Humberstone M, Hirshfield S, Hartel D. Increased HIV disclosure three months after an online video intervention for men who have sex with men (MSM). *AIDS Care* 2009;21(9):1081-9.
49. McOwan A, Gilleece Y, Chislett L, Mandalia S. Can targeted HIV testing campaigns alter health-seeking behaviour? *AIDS Care* 2002;14(3):385-90.

clinic. Increases were proportionately greater in the sub-populations targeted with peer images: a 14-fold rise among those of South European origin ( $P < 0.001$ ), a 6.5-fold rise among those of Black origin, ( $P = 0.003$ ), and a 9.5-fold rise among those under 25 years old ( $P < 0.001$ ).<sup>(49)</sup> Only one of 65 men who registered for an HIV test at the campaign clinic the year before the intervention indicated their attendance was in response to an advertisement, poster or leaflet, compared to 162 of 292 men after the campaign ( $P < 0.001$ ). This suggests that there was a causal relationship between the campaign and the increase in testing at the campaign clinic.<sup>(49)</sup>

An extensive blitz messaging campaign in Toronto and Ottawa (posters, wall projections, banners for the testing clinics, dedicated campaign website, advertisements on websites oriented to gay men, newspaper and magazine ads, ads on a gay radio station, walking billboards at events, outreach via Facebook, and notices posted to gay web-sites) combined with an increase in testing hours and capacity attracted higher risk men who have sex with men to testing.<sup>(5)</sup> Toronto experienced a 20% increase, and Ottawa a 24% increase in men testing over the blitz period compared to the same time period in the previous year: 87% of that increase was attributable to blitz clients. However, the study team concluded that a significant proportion of the increase in testing was due to the increase in testing capacity as opposed to the blitz itself. While more men were tested during the blitz campaign, the overall rate of reactive tests remained relatively constant.<sup>(5)</sup>

A similar “Healthy Penis” campaign in San Francisco to increase syphilis testing included posters on the streets and in bars and commercial sex venues, bus shelters and bus advertising, palm cards, advertising in gay publications, banner advertisements on the most popular internet sites for meeting sexual partners, and campaign linked outreaches.<sup>(9)</sup> Campaign awareness was significantly associated with having a syphilis test in the last six months (OR 3.21; 95%CI 1.30–7.97). HIV-positive status (OR 4.0) and having had casual partners (OR 3.0) were also significant independent correlates of having tested recently.<sup>(9)</sup>

A systematic review that conducted statistical pooling for two of the studies described above – Guy et al, 2002 (19) and McOwan et al, 2002 (49) – showed that multi-media social marketing campaigns had a significant impact on HIV testing uptake among men who have sex with men compared to pre-intervention testing levels (OR 1.58, 95% CI 1.40-1.77).<sup>(1)</sup> However, the campaigns were not found to be effective in increasing STI testing (OR 0.94, 95%CI 0.68-1.28).<sup>(1)</sup> Overall risk of bias of included studies was high and quality of evidence was low.<sup>(1)</sup>

These findings highlight the need to properly evaluate outcomes of health promotion activities to assess their impact and be able to modify them as required.

## Factors That May Impact Local Applicability

Only studies that assessed the effectiveness of various HIV testing interventions in reaching at-risk populations in high-income countries were included (i.e. Canada, US, UK, Australia, the Netherlands). Because of inconclusive results of these studies across the countries and time, and high risk of bias and low quality of evidence, these findings may not be generalizable or transferable.

Although no limits were placed on the search, almost all articles were specific to men who have sex with men, with the exception of one study that also included injection drug users<sup>(10)</sup> and another that focused on probationers and



parolees.(8) It is unclear if these findings are transferable to other high-risk groups.

Finally, the ability of public health infrastructures to support the scale-up of these interventions varies greatly between countries and should be considered during planning. Jurisdictions with budgetary constraints or shortages of trained personnel might find it difficult to bring these and other similar interventions to scale.(3)

## **What We Did**

We searched the Cochrane Collaboration HIV/AIDS review group and [www.healthevidence.org](http://www.healthevidence.org) using key words HIV AND test\*. We searched for relevant references in the identified reviews and further searched citations in the referenced studies. The searches were limited to studies conducted in high-income countries and published since 2000.