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AUSTRALIA

First, do harm reduction

Australia's aggressive efforts to stop HIV's spread via injecting drugs averted a catastrophe

Shortly after a test for HIV came to market in 1985, researchers at St. Vincent's Hospital in Sydney looked for the virus in 200 people receiving treatment for addiction to heroin and other injection drugs. At that point, the small but frightening AIDS epidemic was concentrated in gay men, and only one drug user tested positive. But a closer examination of this man's sexual and needle-sharing contacts, who were not in the initial study, told a more unsettling story: Four of six people tested had the virus. "That study was a real call to action," says Alex Wodak, director emeritus of the hospital's alcohol and drug service. "We knew that we had to do something quickly and what we did had to work."

Wodak convened a meeting of people who injected drugs and professionals who worked with them. "Everybody in the room had exactly the same focus and obsession," Wodak says. "We all wanted to stop the epidemic. And we were all prepared to do whatever it took." They collectively agreed on what was then a radical plan: They would launch

needle and syringe exchange programs as widely as they could to provide clean equipment to users. This was in violation of the country's drug laws, but they so fervently believed in what today is called harm reduction that they decided to take the risk.

The program began in November 1986, and the police vice squad soon called in Wodak, the public face of the effort, for a grilling. "I spoke without pausing for breath and explained to them that this was a serious issue," Wodak recalls.

He barraged the police with statistics about how quickly HIV can spread among people who inject drugs, infecting 50% of a needle-sharing population within 6 months and dramatically accelerating sexual spread. Contaminated needles and syringes, not drugs, transmit viruses, he stressed. A senior policeman then pulled

Wodak aside and told him that they wouldn't be pressing charges. "I knew then that we had won," Wodak says.

Had they ever.

When it comes to HIV infections in people who inject drugs, "we have the most boring graph in the world," says epidemiologist John Kaldor of the Kirby Institute for Infection and Immunity in Society, a branch of the University of New South Wales in Sydney. In many of Australia's neighboring countries, including Indonesia and Malaysia, people who inject drugs

account for a high percentage of infections. But in Australia, only 17 out of 3490 injecting drug users who received yearly HIV tests between 1995 and 2012 became infected, Kaldor and his colleagues reported in the 14 January issue of *AIDS*. The Kirby Institute's latest annual HIV surveillance report

"We all wanted to stop the epidemic. And we were all prepared to do whatever it took."

Alex Wodak, St. Vincent's Hospital



Widespread distribution of needles and syringes worked.

found that between 2008 and 2012, injecting drug use accounted for just 2% of new HIV diagnoses in Australia. Men having sex with men accounted for most new diagnoses (67%), followed by heterosexual sex (25%).

By 1987, the state of New South Wales endorsed needle and syringe programs, and in 1989, the first national HIV/AIDS strategy plan said this would be a key component of the country's response. Overall, needle and syringe programs had averted more than 57,000 HIV infections by 2009, according to Australia's Department of Health and Ageing. Between 2000 and 2009, the country's investment of just over US\$200 million had saved US\$1.2 billion in health care costs.

Today, Australia has more than 3000 sites that distribute some 30 million needles and syringes to drug users each year. The U.S. government, in contrast, bans funding of similar programs, although about 200 sites operate legally in various states. According to the U.S. Centers for Disease Control and Prevention, 16% of the people living with HIV in the country were infected by sharing needles and syringes.

Australia's early embrace of HIV harm reduction strategies was sparked in no small part by a "national psychodrama" that was playing out at the time, Wodak says: When the AIDS epidemic emerged in Australia, the prime minister's daughter was battling heroin addiction. Other factors entered in

The limits of success

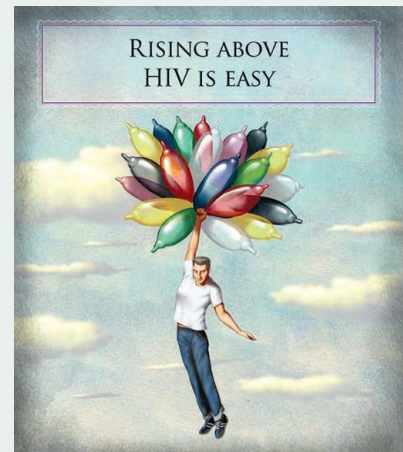
Only 1253 people received an HIV diagnosis in Australia in 2012, a testament to nearly 3 decades of aggressive prevention efforts. But there's a troubling caveat: The number of new diagnoses jumped 10% from the preceding year, and cases have steadily risen since 1999. And 70% of the new infections occurred in men who have sex with men (MSM).

Every country in the world has struggled to slow the spread in MSM. But the growing problem in Australia has spotlighted the limitations of one of the most promising new prevention tools. A landmark 2011 study proved that if infected people faithfully took their antiretroviral (ARV) drugs and had undetectable viral levels on standard tests, the risk of transmission via heterosexual sex was nearly eliminated, falling by 96% (*Science*, 23 December 2011, p. 1628). Hopes soared that adding treatment as prevention to the arsenal of proven interventions could bring AIDS epidemics in communities to a halt.

Australia has universal health care and access to the latest ARVs, and most people who learn they are infected promptly start treatment. In a study published in the July 2012 issue of *PLOS Medicine*, epidemiologist David Wilson of the Kirby Institute for Infection and Immunity in Society in Sydney noted that as many as 75% of MSM in Australia reported taking an HIV test annually, and 70% of infected people received ARVs. In 90% of those, viral levels were fully suppressed. But that has not stopped the rise in new cases among MSM. "Why's there a disconnect with 'test and treat?'" asks David Cooper, who heads the Kirby Institute.

One possible answer is that treatment as prevention simply doesn't work as well with MSM. Anal intercourse has an 18-fold higher probability of transmitting HIV than vaginal intercourse, according to a 2010 study. MSM also tend to have more partners, increasing the odds that the virus will spread.

Wilson, a mathematical modeler and head of the Kirby's surveillance division, also notes that more treatment means more HIV-infected people



MSM-targeted Fear Less Live More poster.

survive who can potentially spread the infection, as some undoubtedly will remain infectious. Treated people may also engage in riskier behavior that, in a population sense, overwhelms the benefits of the drugs. And the virus is often transmitted by recently infected people who have yet to develop high enough antibody levels to be detected on standard tests.

Clearly, if every infected person took ARVs every day and had undetectable viral levels, transmission would likely plummet in MSM communities. But that's unrealistic. So Wilson and his team published a modeling exercise online on 7 February in *Sexual Health* that explored what it would take to lower new HIV infection rates in Australia's MSM population. The researchers looked at the impact of earlier detection of infection and initiation of treatment. But the factor that stood out most was the effect treatment has on transmission.

If ARVs indeed lower the risk of transmission in MSM by 96%—as much as it does in heterosexuals—then treating 90% of people would cut new infections by 55% in 5 years. On the other hand, if ARVs offer a mere 26% protection in MSM, the same scenario would avert a measly 9% of infections. "The jury is still out with regard to how much treatment decreases infectivity with male-to-male sex," Wilson says.

Even if it does work as well in MSM, which the Kirby Institute is now studying, the country still must substantially increase the number of people on ARVs—and it's notoriously difficult to improve on success. ■

as well. Neal Blewett, the minister of health, rallied bipartisan support for a strong HIV/AIDS response and included representatives from the drug-using community in the discussions. And Wodak believes that Australia's history as a British penal colony helped, too. "Convicts are practical people—they're not ideologues," he says.

The Australian government soon went beyond its support of needle and syringe programs, allowing a center to open in 2001, under the auspices of a church group, where users could inject drugs with clean equipment under medical supervision—without fear of prosecution. Located near a busy subway stop, the Sydney Medically Supervised Injecting Centre (MSIC) was the first facility of its kind outside of a few European coun-

(HCV) spotlights. HCV is transmitted by needle and syringe sharing much more easily than HIV is, and it was already widespread when harm reduction efforts began for HIV. According to Department of Health and Ageing estimates, this liver-damaging virus had infected more than 80,000 people by 1986. That number grew to 200,000 by 2000, despite needle and syringe programs. Yet, without those programs, the country would have faced a much larger HCV epidemic: The health department estimates that they prevented more than 100,000 new HCV infections.

Harm reduction programs for both HIV and HCV also overlooked some marginalized populations for a time. A study published in the October 2006 issue of

PAPUA NEW GUINEA

In PNG, the epidemic that wasn't

Data vacuum despite improved surveillance

A decade ago, the forecast for the island of New Guinea was dire. A heterosexual epidemic was set to explode, a team of leading international epidemiologists predicted in a report called *AIDS in Asia: Face the Facts*. They warned that "there is every indication that the island is facing an epidemic which resembles those seen in parts of sub-Saharan Africa." Papua New Guinea (PNG), which shares the island with Indonesia, structured its response to its epidemic based on those early predictions. But the bomb never went off.

To this day, PNG struggles to describe not only why those early predictions were so wide off the mark, but also the exact contours of the smaller, but still serious, epidemic the country is experiencing today. That confusion has come at a steep price, particularly when it comes to decisions about where to target prevention efforts. "It gives rise to a very unfocused program," says Stuart Watson, country coordinator in PNG for the Joint United Nations Programme on HIV/AIDS (UNAIDS). "We don't know exactly what we're responding to, and, as a result, we respond to everything."

Epidemiologists have long had good reason to fear a serious heterosexual epidemic in PNG. Reported condom use is low. Medically supervised circumcision, which protects heterosexual men from HIV, is rare. Sexual violence, in contrast, is rampant; a survey published in the October 2013 issue of *The Lancet Global Health* found that 40% of PNG men interviewed reported having raped a female "non-partner." One recent study in a highlands community and Port Moresby, the capital, found that more than 20% of the 154 people tested at sexual health clinics were infected with chlamydia or gonorrhea.

Early predictions suggested that by 2014, 10% of the adults in PNG would be infected with HIV. According to the PNG National Department of Health, the estimate of the adult prevalence today is 0.65%. Watson thinks that understates the true prevalence. "Ask most people cold-face if they believe those



Marianne Jauncey, a physician, oversees an injection center where people can fix in a safe environment.

tries, and the feedback from clients has been overwhelmingly positive, says the center's medical director, Marianne Jauncey. "The single starkest, most commonly repeated phrase is, "Thank you for treating me like a human being," Jauncey says.

A series of independent reviews has found that MSIC has delivered on its promise. The latest, published by the accounting firm KPMG in 2010, found that the center had supervised more than 600,000 injections, referring about one-third of its clients to drug treatment. It managed nearly 3500 overdoses without a single death and saved the health system some US\$600,000 per year. Since the site's opening, HIV infection rates have dropped in the nearby neighborhoods, although the review did not have enough data to link MSIC to the decline.

Australia's harm reduction effort has had its limits, which the hepatitis C virus

Addiction found few services were available for "ethnic minorities"—a group that included indigenous Australians and immigrants from Vietnam and other Southeast Asian countries—who injected drugs in Sydney and in less urban sites around New South Wales. "It was a harm reduction nightmare," says Lisa Maher, an epidemiologist at the Kirby Institute who led the study. Over 3 years, 31% of the ethnic minorities in the 368-person study became infected with

HCV, a rate three times higher than seen in the non-ethnic minority group. Needle and syringe programs and the accompanying health services for people who inject drugs have since expanded to these communities.

Wodak stresses that harm reduction can only do what its name implies. "We're happy to make a bad problem less bad," Wodak says. "We don't have to eradicate the problem in order to feel that we've succeeded." ■

VIDEO

Harm reduction in Australia, <http://scim.ag/hiv2014>.

Science

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