

Prevention of HIV/AIDS on the Home Front: Lessons Learned from our Global Neighbors

By

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Abstract

The Human Immunodeficiency Virus, or HIV, epidemic represents one of the greatest public health challenges of the late 20th and now, early 21st century. According to the World Health Organization (2013), approximately 70 million people have been infected with HIV worldwide since the beginning of the epidemic and approximately 35 million people have perished. To date, great strides have been made therapeutically in the creation and distribution of HIV antiretrovirals (ARVs) that can keep viral levels low in the infected individual thus prolonging his/her life expectancy; however, in the absence of an effective vaccine, prevention still is the most viable method of combating the pandemic. As the greatest burden of the epidemic lies outside the United States, there have been a plethora of prevention programs that have been launched internationally to combat HIV infection. Programs offering voluntary counseling and testing, condom distribution, needle/syringe exchange, and antiretroviral distribution have shown success in reducing HIV incidence in a wide range of geographic locations, including developing countries, where they have been launched. While many of the concepts of the programs are not new to the United States; to date, most prevention efforts have been sporadic and focused at the state or local level as opposed to federally-funded, evidence-based prevention programs on a national scale. Utilizing information gleaned from other countries, and especially developing countries, a series of recommendations are presented for how to improve HIV prevention efforts in the United States. Barriers to implementation of these ideas are also discussed and methods to overcome these barriers are presented, including social marketing, a field of study and practice that can be potentially utilized to launch prevention efforts in the communities of individuals that are most at risk.

Glossary of Terms

ADAP	AIDS Drug Assistance Program
AIDS	Acquired Immune Deficiency Syndrome
ARV	Antiretrovirals
CARE	Comprehensive AIDS Resources Emergency
AZT	Zidovudine
CD4+ T-cells	A major component of the human immune system responsible for fighting infection
CDC	United States Centers for Disease Control and Prevention
CSM	Condom Social Marketing
FPLs	Federal Poverty Levels
HIV	Human Immunodeficiency Virus
HIV Serodiscordant couple	A relationship where one partner is HIV positive and one partner is HIV negative
HIV Seroprevalence	The frequency of individuals in a population that have antibodies to HIV in their blood serum
HOPWA	Housing Opportunities for Persons With AIDS
Incidence	The number of new infections over a given period of time
IDU	Injecting Drug Use
iPrEX	Pre-exposure Prophylaxis Initiative
MSM	Men who have sex with men
PEPFAR	United States President's Emergency Plan For AIDS Relief
NIMBY	Not In My Backyard
Prevalence	The total number of infections in a given population
NEP	Needle/syringe exchange program
SIV	Simian Immunodeficiency Virus
UNAIDS	Joint United Nations Programme on HIV/AIDS
VCT	Voluntary Counseling and Testing
Viral load	The amount of virus present in an infected individual
WHO	World Health Organization

Introduction

According to the World Health Organization (WHO), approximately 35.4 million people are currently living with Human Immunodeficiency Virus (HIV) (Organization, 2013c) and there continue to be over 2 million new infections globally each year (Joint United Nations Programme on HIV/AIDS, 2013b). Since the epidemic began, approximately 30 million people have died globally (C. f. D. C. a. Prevention, 2013c). As of 2011, the most current statistics available, HIV and Acquired Immune Deficiency Syndrome (AIDS) was the 6th leading cause of death worldwide with 1.6 million attributed deaths (Organization, 2013d). HIV/AIDS also ranked as the 6th leading cause of death globally over the entire decade spanning 2001 to 2011 (Organization, 2013d).

There is great disparity between developing and developed countries, however, in the burden of the epidemic in terms of prevalence, incidence, and number of deaths. In some developing countries in sub-Saharan Africa, the prevalence rates of HIV/AIDS range from 10-30% of the adult population (age 15-49) (Organization, 2013a) and there over 1.8 million new infections each year (Joint United Nations Programme on HIV/AIDS, 2013b). In contrast, the prevalence rate of HIV in the United States for the same age category is approximately 0.7% (Organization, 2013a) with approximately 50,000 new infections per year (C. f. D. C. a. Prevention, 2013d). In low income countries in 2011, HIV/AIDS ranks as the 2nd leading cause of death with approximately 70 deaths per 100,000 people (Organization, 2013d). Conversely, among middle to high income countries, HIV/AIDS does not factor into the top 10 leading causes of death (Organization, 2013d).

While the global burden of HIV/AIDS primarily lies in developing countries, there are still approximately 1.1 million infections in the United States (est. 2009) (C. f. D. C. a.

Prevention, 2013c). Perhaps more troubling is the fact that HIV incidence in developing countries has dropped on average 30% over the past 10 years versus remaining virtually unchanged in the United States (Joint United Nations Programme on HIV/AIDS, 2013b; C. f. D. C. a. Prevention, 2013d). A possible explanation for this trend is that of those HIV positive in the United States, 18.1% of the individuals do not know of their infection (Prevention, 2013b). This creates a unique public health challenge as the potential exists for those who are asymptomatic (as characteristic of early acute infection) to potentially spread the virus unknowingly, thus hampering efforts to prevent the spread of the epidemic.

Due to the gravity of the epidemic and its potentially devastating effects in developing countries, many programs have been launched that focus on preventing new infections from occurring. These prevention programs have utilized successful strategies that may serve as a model for implementation to a greater degree in the United States where resources are more bountiful. To examine the issue, a brief history of HIV/AIDS and HIV/AIDS epidemiology will be presented followed by prevention strategies that have been successfully launched in developing and other international countries. Finally, recommendations for the implementation of these strategies in the United States will be discussed along with potential barriers, and potential solutions to overcome these barriers.

History of HIV/AIDS

HIV is thought to have originated as Simian Immunodeficiency Virus (SIV), a virus that affects primarily non-human primates (AVERT, 2013b). It is hypothesized that multiple strains of SIV recombined to form a strain that was capable of infecting

chimpanzees (Bailes et al., 2003). Due to genetic similarities between the SIV that infects chimpanzees and HIV, it is further hypothesized that cross-species transmission occurred between chimpanzees and humans (Gao et al., 1999). The exact point of crossover is not known; however, some of the earliest confirmed cases were identified in the late 1950s in the Democratic Republic of Congo. The beginning of the HIV epidemic in the United States, however, is not attributed until the issuance of the “Morbidity and Mortality Weekly Report” by the United States Centers for Disease Control and Prevention (CDC) where a group of 5 previously healthy gay males mysteriously presented with a rare form of pneumonia, *Pneumocystis carinii* pneumonia, in June 1981 (U. D. o. H. a. H. Services, 2013a). Following the publication, reports of similar illnesses and even some rare forms of cancer in previously healthy individuals occurred nationwide (U. D. o. H. a. H. Services, 2013a). By the end of the year, there were 270 reported cases and of those, 121 had died.

HIV/AIDS Epidemiology

Biology

HIV is a retrovirus that targets CD4+ T-cells, a major component of the immune system that enables the host to fight infection. The virus enters the cells of the immune system through the cell membrane and utilizes the host cell's nucleus to replicate into infectious viral particles. The infectious viral particles exit the cell by budding from the host cell membrane, which effectively kills the host cell, and go on to infect other CD4+ cells. The result of this process is the systematic destruction of a major component of the immune system thus eventually rendering the host unable to fight opportunistic infection. A person infected with HIV progresses to a disease state known as AIDS when his/her

CD4+ T-cell count falls below 200 cells/mm³ or when the person presents with an AIDS-related complication (i.e. *Pneumocystis carinii* pneumonia, cytomegalovirus, tuberculosis, toxoplasmosis) (Clinic, 2013). When an individual reaches the AIDS disease-state, he/she is at risk for an opportunistic infection that could be life-threatening. There is no vaccine or cure for HIV and an infected person, without treatment with antiretrovirals (ARVs), will typically present with signs of an HIV-related illness within 5-10 years of acquisition and be diagnosed with AIDS within 10-15 years of acquisition (Organization, 2013b).

Transmission Routes

The transmission of HIV in the United States is through two primary routes: sexually through unprotected contact (vaginally or anally) with an infected individual or mucosally through contact with infectious blood/bodily fluids (i.e. needle sharing with an HIV-infected person) (C. f. D. C. a. Prevention, 2010a). Other less common forms of transmission include from mother to child during childbirth or breastfeeding, oral sex, and blood transfusions or organ transplantation (C. f. D. C. a. Prevention, 2010a).

Burden of Disease in the United States

As of 2009, the CDC currently estimated that 1,148,200 people aged 13 and older were HIV positive in the United States (C. f. D. C. a. Prevention, 2013d). Surveillance efforts have shown that approximately 92% of HIV/AIDS cases reside in metropolitan areas with a population greater or equal to 50,000. Geographically, a great burden of these HIV/AIDS infections were located in the southern United States (C. f. D. C. a. Prevention, 2010b). Prevalence rate estimates in these states were over 319.4 per 100,000 individuals (C. f. D.

C. a. Prevention, 2010b). In terms of the race most effected in the southern United States, blacks accounted for the greatest proportion of HIV/AIDS diagnoses (C. f. D. C. a. Prevention, 2010b). When examining risk groups, gay, bisexual, and men who have sex with men (MSM) are the ones most at risk for acquiring HIV/AIDS. Within this population, new infections increased 12% between 2008 and 2010 and incidence estimates for 2011 include 30,573 out of 49,081 total new infections (C. f. D. C. a. Prevention, 2013d). In particular, young black MSM (aged 13-24) accounted for 45% of all new black MSM infections and 55% of all new young MSM infections in 2010 (C. f. D. C. a. Prevention, 2013d). Another high risk group at risk for acquiring HIV/AIDS infection is the homeless. According to the National Alliance to End Homelessness, approximately 3.4% of the people that were homeless were HIV positive in 2006 as opposed to 0.4% of the general United States population (Homeless, 2009). Prevalence rates suggest that 1.1% to 5.3% of homeless youth are HIV positive (Ennett, Federman, Bailey, Ringwalt, & Hubbard, 1999).

Socioeconomic Considerations

There are many socioeconomic factors as to why these groups bear the burden of the epidemic. (C. f. D. C. a. Prevention, 2013b) MSM face stigma and marginalization on many different fronts (interpersonal, institutional, community, governmental) which can lead to mental health disorders (major depression, bipolar disorder, generalized anxiety disorder) (C. f. D. C. a. Prevention, 2013b). Many MSM are shunned from traditional family structures which can lead to homelessness. Additionally, studies have revealed that MSM have up to a seven-fold higher illicit drug use as opposed to similar group of single urban men (Thiede et al., 2003). This illicit drug use has been shown to be associated with high

risk sexual behaviors which lead to increased HIV incidence (Thiede et al., 2003). Research has shown that homelessness is often coincident with poverty, mental health issues, drug use, and poorer health outcomes (Kidder, Wolitski, Campsmith, & Nakamura, 2007). Additionally, studies have indicated that the homeless are more likely to participate in high risk behaviors such as risky sexual practices, injection drug use, and trading sex for money/food/shelter (Kidder et al., 2007). Homeless youth often times have to resort to “survival sex”, that is, performing sexual favors in exchange for food or shelter (Ennett et al., 1999). Additionally, a large percentage of these individuals resort to high risk behaviors such as using drugs and having multiple sexual partners (Ennett et al., 1999).

Treatment of HIV-infected individuals

Antiretroviral treatments

The development of the first antiretroviral treatment, Zidovudine, or AZT, in 1987 signaled an end to the “death sentence” that formerly plagued HIV positive individuals (Brook, 1987). At the time, AZT was only recommended for patients with advanced illness associated with AIDS, such as *Pneumocystis carinii* (Brook, 1987). Since AZT was first accepted as treatment, there have been thirty new drugs that have been developed to combat HIV/AIDS in six main classes (AVERT, 2013a; Volberding & Deeks, 2010). Each class of drug attacks HIV in a slightly different way and today advances have been made where treatment regimens exist in as little as one pill a day. Recent recommendations from studies advocate beginning antiretroviral treatment earlier in the disease state (when CD4+ T-cell counts are above 350/mm³) for better outcomes. Regardless of when antiretroviral treatment is started, adherence to drug regimens remains one of the keys to

continued viral suppression, favorable life outcomes, and to the absence of drug-resistant strains of virus. This is not easily achieved universally as there can be unpleasant side effects to some drug regimens such as renal problems, cardiovascular events, lipoatrophy, and lipohypertrophy (Volberding & Deeks, 2010). This may result in patients suspending or discontinuing treatment regimens which could lead to substantial decreases in life expectancy (Losina et al., 2009).

Prevention of HIV/AIDS

Traditional Methods

As the primary routes of transmission of HIV are sexually and through contact with infectious blood/bodily fluid, traditional mechanisms of prevention have focused on blocking entry of infectious material into the body and/or limiting potential exposure to infected individuals. Prevention strategies include abstinence, reduction in the number of sexual partners (or even monogamy), use of condoms, and elimination of needle/syringe sharing by drug users. While these strategies are effective at reducing HIV transmission, they have not been universally accepted and promoted due to fears of promoting illicit behaviors and a lack of perceived feasibility.

Treatment as a Form of Prevention

There has been recent research, however, suggesting the potential benefit of utilizing ARVs as a pre-exposure prophylactic, that is, using ARVs to prevent HIV infection. A randomized, controlled trial called the Pre-exposure Prophylaxis Initiative, or iPrEx, conducted in a population of 2,499 HIV-uninfected men who have sex with men (MSM)

across six countries (Ecuador, Peru, Brazil, United States, South Africa, and Thailand) who were administered either a combination therapy consisting of two ARVs, Emtricitabine and Tenofovir , or a placebo, showed that individuals that were administered the ARVs had a 44% greater level of protection against HIV (Grant et al., 2010). The adherence rate was estimated to be between 89-95% by researchers (Grant et al., 2010). It was hypothesized that the occurrence of adverse events such as nausea may have led to decreased adherence (Grant et al., 2010). A subsequent analysis of a subset of the original iPrEx group, examined the levels of the ARVs in the participant's peripheral blood mononuclear cells (PBMC) found that the individuals who maintained a certain level of ARVs in their PBMC reduced their effective risk of HIV acquisition by approximately 90% (Anderson et al., 2012). The amount of medication that required these protective levels corresponded to 4 or more tablets per week (Anderson et al., 2012). Finally, a study in the HIV Prevention Trials Network was conducted among 1,763 serodiscordant couples (a relationship where one partner is HIV positive and one partner is HIV negative) in 9 countries across 3 continents (Botswana, Kenya, Malawi, South Africa, Zimbabwe, Brazil, India, Thailand, United States) analyzing the effectiveness of preventing HIV infection by reducing viral replication (Cohen et al., 2011). The study found that linked HIV transmission events between HIV positive individuals with CD4+ counts between 350-550/mm³ who were on antiretroviral treatment were reduced by 96% (Cohen et al., 2011). It was hypothesized by the researchers that this was due to lower levels of virus in the genital secretions due to the ARVs (Cohen et al., 2011). The results of these studies led to the approval of antiretroviral therapy by the United States Food and Drug Administration for the prevention of HIV infection.

Current United States Domestic Efforts

United States Federal Funding for AIDS

According to the Henry J. Kaiser Family Foundation, federal funding for HIV/AIDS makes up less than 1% of the overall federal budget, despite the fact that more people are living with HIV/AIDS in the United States than ever before (Foundation, 2013a). HIV/AIDS funding by the federal government generally falls into four broad categories: care, cash/housing assistance, prevention, and research (Foundation, 2013a). Over the past 4 years, money allocated for domestic HIV/AIDS prevention efforts has made up the smallest percentage of the United States' federal HIV/AIDS budget (Foundation, 2013a). According to the foundation, HIV/AIDS prevention accounted for on average 4.8% of the total domestic HIV/AIDS budget while care and cash/housing assistance accounted for on average 81.4% of the total domestic HIV/AIDS budget (Foundation, 2013a). In fact, in 2009, the United States spent \$15.7 billion on AIDS care and housing/cash as opposed to \$0.9 billion for prevention efforts (Foundation, 2013a). Based on the estimated number of HIV/AIDS infected individuals in the United States in 2009 (1,148,200), the federal government in 2009 spent approximately \$13,064 per person on AIDS care and housing/cash (Foundation, 2013a; C. f. D. C. a. Prevention, 2013d). According to a 2006 estimate, the cost of receiving HIV/AIDS care exceeds \$2,100 per month which corresponds to over \$25,200 per person per year (Schackman et al., 2006). While the budget for HIV/AIDS has steadily increased over the past 4 years, it has not kept pace with the rising number of infections ; clearly more needs to be done on the prevention front as

preventative efforts can be more cost-effective than therapeutic measures (Foundation, 2013a).

Ryan White Comprehensive AIDS Resources Emergency (CARE) and AIDS Drug Assistance Programs (ADAP)

Currently, the United States employs several social programs to help combat the HIV/AIDS epidemic on the federal, state, and local level. The Ryan White CARE (Comprehensive AIDS Resources Emergency) Act of 1990 was enacted to assist individuals with HIV/AIDS that had no health insurance, insufficient health coverage, or inadequate financial resources to receive the proper care for their disease (U. D. o. H. a. H. Services, 2013b) Through the Ryan White CARE Act, federal funding was mobilized for social programs on the state level such as the AIDS Drug Assistance Programs (ADAP). Many of the ADAPs today are federally and state funded organizations within the Department of Health and Human Services. As a provision of Ryan White CARE funding, ADAPs provide low or no-cost medications against HIV or opportunistic infections to participants living at or below a certain percentage of the federal poverty levels (FPLs). An example of how ADAPs work can be taken from the North Carolina ADAP which is administered by the North Carolina Division of Public Health – Communicable Disease Branch. To be eligible, applicants must be HIV positive, must be a resident of the state of North Carolina, must live at or below 300% of the FPL, not have any third-party insurance coverage, and must have at least one valid prescription that is on the NC ADAP formulary (N. C. D. o. H. a. H. Services, 2013). Participants in North Carolina ADAP then receive their medications via a mail-order pharmacy at little or no cost (N. C. D. o. H. a. H. Services, 2013). Other states' ADAPs may

function slightly differently in their eligibility criteria and medication delivery mechanism; however, HIV/AIDS medications are generally provided at no or low cost to the program participant.

Housing Opportunities for Persons With AIDS (HOPWA)

Another social program that is administered by the federal government is Housing Opportunities for Persons With AIDS (HOPWA). HOPWA provides grants to states and local communities to provide housing assistance and other social support services to people living with HIV/AIDS (Development, 2013). Grantees may use HOPWA funding for the acquisition and renovation of housing structures, to cover the cost of operating housing facilities, and also to provide for rental assistance to those in need to prevent homelessness (Development, 2013). Additionally, grantees may use HOPWA funding to provide health care and mental health services, drug addiction treatment, HIV/AIDS case management, and nutritional counseling/assistance (Development, 2013).

Successful International Prevention Strategies

United States Funding Efforts in Developing Countries

Due to the lack of financial resources and infrastructure of developing countries, many of the prevention efforts have been supported by grants from the governments of developed countries. One such grant, the United States President's Emergency Plan For AIDS Relief, or PEPFAR, was created in 2003 as a 5-year, \$15 billion commitment to combat global HIV/AIDS among other diseases (Foundation, 2013b). The grant, which was refunded for 5 additional years in 2008, is used to provide antiretroviral access as well as

prevention programs to those countries hardest hit by the epidemic (Foundation, 2013b). Funding such as this has enabled many of the programs described below, which can be used to support implementation of evidence-based strategies in the United States.

Uganda “A,B,C” Campaign

One good example of a locally-developed international strategy that has shown success in prevention efforts is the “ABC” campaign that was advocated in Uganda. The campaign, which stands for “Abstain”, “Be faithful”, and “always use a Condom” was first implemented in the late 1980s and early 1990s. The prevalence of HIV/AIDS in Uganda peaked in 1981 at approximately 15% and dropped to approximately 5% by the year 2001 (Murphy, Greene, Mihailovic, & Olupot-Olupot, 2006). When analyzing epidemiological data that was gleaned from the campaign, researchers found data that supported the effectiveness of the “abstinence” and “be faithful” portions of the campaign. In terms of the median ages of sexual debut for females and males, the age rose 1.2 years for females and 1.7 years for males between 1989 and 2000 (Murphy et al., 2006). Additionally, the percentage of 15-19 year old females that reported ever having sex was reduced from 74% to 51% and the percentage of males in the same age category that reported ever having sex was reduced from 68% to 42% (Murphy et al., 2006). The percentage of women reporting multiple casual sex partners was reduced from 16% in 1989 to 6% in 1995. Similarly, among the male population during the same time period, the percentage was reduced from 35% to 15% (Murphy et al., 2006). Promoting the use of condoms was also effective albeit at a slower pace than the “A” and “B” portions of the campaign. Condom use among married women rose from 0% in 1988 to 0.8% in 1995 to 1.9% in 2000 and for unmarried,

sexually active women, rose from 0% in 1988 to 15.4% in 1995 to 29% in 2000 (Murphy et al., 2006). For unmarried men ages 15-24, condom use between 1995 and 2000 rose from 39% to 57% (Murphy et al., 2006).

Voluntary Counseling and Testing (VCT)

Another strategy that has proven fruitful has been the voluntary counseling and testing (VCT). Voluntary counseling and testing aims to provide individuals an opportunity to get tested for HIV to know their status and to obtain counseling to change their risk behaviors to prevent infection of themselves or others (if infected) (Weinhardt, Carey, Johnson, & Bickham, 1999). Previous studies have shown that behavior change among HIV serodiscordant couples has been strongest among those undergoing VCT (Denison, O'Reilly, Schmid, Kennedy, & Sweat, 2008; Higgins et al., 1991). VCT has been launched in many developing countries such as South Africa, Kenya, and Tanzania, and has shown to be a cost-effective mechanism of HIV prevention (Creese, Floyd, Alban, & Guinness, 2002). One prominent randomized trial conducted in Tanzania, Kenya, and Trinidad showed that the proportion of men reporting unprotected sex with non-primary partners decreased 35% in the group receiving VCT as opposed to 13% in the control group which received only health information. In the same study, the proportion of women reporting unprotected sex with non-primary partners decreased 39% in the group receiving VCT as opposed to 17% in the control group. Likewise, couples in which one or both partners were HIV positive were significantly less likely to report unprotected intercourse following VCT as opposed to HIV negative couples ("Efficacy of voluntary HIV-1 counselling and testing in individuals and couples in Kenya, Tanzania, and Trinidad: a

randomised trial. The Voluntary HIV-1 Counseling and Testing Efficacy Study Group," 2000).

Needle/Syringe Exchange Programs (NEP)

Needle/syringe exchange programs (NEPs) have also shown promise as potent prevention strategies against HIV acquisition among injecting drug users internationally. NEPs operate by allowing individuals to trade-in used potentially-contaminated needles/syringes and, in exchange, receive an equal number of new needles/syringes at little or no cost. By requiring an individual to return a used needle/syringe, one effectively reduces the probability that the contaminated needle/syringe is reused or disposed of improperly. At the beginning of the HIV/AIDS epidemic injecting drug use (IDU) was more of an issue in developed countries in North America and Europe; however, by 1992 IDU had spread to 80 countries and territories (Crisis, 2009). Due to the relative novelty of IDU in the developing world, most of the published research on NEPs has been performed in developed international countries such as the Netherlands, United Kingdom, Australia, and New Zealand. Additionally, due to issues such as political instability and cultural/religious/legal norms in many developing countries, evaluation of the effectiveness of NEPs is difficult (Crisis, 2009).

NEPs in response to the HIV/AIDS epidemic were started by government agencies as early as 1984 in Amsterdam and have also been implemented extensively in the United Kingdom beginning in 1986 and Australia in 1987 (Hurley, Jolley, & Kaldor, 1997; Lurie & Drucker, 1997; Stimson, 1989). Studies in these countries have shown that HIV seroprevalence, or the frequency of individuals with HIV antibodies in their blood, in

injecting drug users in cities without NEPs increased an average of 5.9% and seroprevalence in injecting drug users in cities with NEPs decreased an average of 5.8% - leading to an approximate difference of 12% (Hurley et al., 1997).

Increased Access to HIV ARVs

As previously mentioned, a great burden of the HIV/AIDS epidemic lies in developing countries, and in particular, those of sub-Saharan Africa. In South Africa, for instance, approximately 5.5 million of the 53 million citizens are infected with HIV (Beaubien, 2013). To address this threat, the South African government, after years of inaction and denial, launched an initiative to provide HIV ARVs through the public health care system to citizens free of charge (Beaubien, 2013). This initiative was made possible through the reduction of cost of ARVs to around \$114 per person per year through a competitive bidding process (Joint United Nations Programme on HIV/AIDS, 2013a). Today, ARVs are provided to approximately 2 million South Africans by the federal government (Beaubien, 2013). It is reasonable to assume that this effort has helped to contribute to drop in average annual AIDS deaths from 350,000 in 2005 to 190,000 in 2012 (Beaubien, 2013). Additionally, programs such as the one in South Africa is expected to yield cost savings around 20% (Joint United Nations Programme on HIV/AIDS, 2013a). Finally, as presented above, by linking more HIV-infected individuals to antiretroviral treatments, the frequency of transmission to others is reduced.

Recommendations

As seen by the successes for the prevention of HIV/AIDS internationally, presumably enacting some of the same strategies in the United States is warranted where resources are greater. To date, many of the aforementioned prevention programs such as condom distribution and needle exchange have been launched on state or local levels with varying levels of success (Hurley et al., 1997; C. f. D. C. a. Prevention, 2013a). It is therefore recommended that these programs be offered on a federal level utilizing federal funding. By doing so, programs can convey consistent messages and offer the same services to individuals regardless of the state of residency. In fact, many of the above strategies have been advocated by the CDC. The CDC recommends condom distribution for communities as a structural level intervention in addition to other prevention programs (C. f. D. C. a. Prevention, 2013a). Within this recommendation, the CDC advocates promoting condom distribution and use through a social marketing campaign, thereby increasing awareness of condom benefits and normalizing use. Additionally, the CDC has issued guidelines for HIV/AIDS counseling, testing, and referral. In these guideline, the CDC advocates increasing the availability of anonymous, confidential voluntary testing as well as a counseling approach to reduce risk behaviors in those individuals at high risk of contracting or spreading HIV (C. f. D. C. a. Prevention, 2001).

Increased Voluntary Counseling and Testing

One recommendation is to increase the implementation of VCT in the United States utilizing federal funding to expand counseling and testing centers in the inner city communities within the United States. This would allow services to be available in the areas that bear the greatest burden within the United States. As previously mentioned,

approximately 18.1% of the individuals infected with HIV do not know that they are infected, which could lead to inadvertent transmission to sexual partners or other injecting drug users.

Condom Distribution

It is also recommended that federally-supported condom distribution programs be expanded especially to high risk sexual populations, such as MSM and the homeless. It has been shown that consistent, proper condom usage can reduce the risk of acquiring HIV by 80% or more (Weller & Davis, 2002). Along with condom distribution, federal funding should support increased education on their proper usage and protective benefits as the effectiveness of a condom decreases drastically with improper use. By increasing access to and education about condoms, presumably use will increase thereby averting sexual transmission of the virus.

Needle/syringe exchange

Needle/syringe exchange, to date, has not been an HIV/AIDS prevention effort that has been embraced in the United States. In 1988, the federal government enacted a ban on utilizing federal funding for NEPs (Lurie & Drucker, 1997). In order for federal funding to be used, there must be evidence of decreased HIV transmission and no increase in the prevalence of illegal IDU (Lurie & Drucker, 1997). It has been estimated that due to this reluctance of the United States federal government to fund NEPs, that approximately 5,000 to 11,000 preventable HIV infections occurred between 1996 and 2000 and the cost of treating these HIV/AIDS cases was approximately 287-660 million dollars (Lurie &

Drucker, 1997). The ban on federal funding for needle/syringe exchange was temporarily lifted by President Barack Obama in 2009, however, the ban was restored by U.S. Congress in 2011 (International, 2011). However, as has been shown in other countries such as the Netherlands, needle/syringe exchange can be a potent preventative measure against HIV acquisition among those engaging in IDU. Therefore, another recommendation for HIV/AIDS prevention would be to permanently remove the ban on federal funding for NEPs. Studies analyzing data from countries successfully utilizing the programs (i.e. Netherlands and Australia) have shown that needle exchange does not promote illicit IDU. The NEPs could be coupled with substance abuse and chemical dependency services to assist those individuals battling with addiction to injecting drugs. This mechanism has been presented as a plausible way to reduce direct HIV transmission through needle/syringe sharing.

Prophylactic Prevention *with ARVs*

A final recommendation would be to continue to advocate the usage of ARVs to uninfected, high risk individuals as a method of prophylactic prevention. As previously mentioned, a study in a high risk cohort showed that men who maintained a certain level of antiretroviral in their blood, were conferred protection against HIV acquisition on the order of 90% (Grant et al., 2010). In 2012, the CDC issued guidance on the use of pre-exposure prophylaxis for the prevention of sexual transmission of HIV (Choopanya et al., 2013). The United States Food and Drug Administration followed with their approval for the use of pre-exposure prophylaxis (Administration, 2012). In 2013, researchers published findings that pre-exposure prophylaxis was also effective at reducing

transmission of HIV in injecting drug users by 48.9%. Availability of these ARVs could be increased, once again, by expanding the federal funding to programs like ADAP that can provide free or subsidized medications to those at highest risk. This increased funding could support expansion to allow for the inclusion of a greater number of individuals living with HIV/AIDS within the United States, perhaps most, if not all, individuals infected with HIV. The program could be organized as a tiered system whereby subsidies for HIV/AIDS medications could be granted based on income to those who do not qualify for free medications. By increasing the percentage of the infected population that have access to antiretroviral medications, one increases individual life outcomes. This presumably would reduce potential future healthcare costs associated with AIDS-related health conditions.

In addition to providing antiretroviral medication, efforts should be made to educate those on ARVs about the importance of adhering to their drug regimens. As studies have shown, efficacy of both prophylactic and therapeutic use of ARVs is dependent on maintaining levels of the medication in the blood. Additionally, viral resistance to antiretroviral medication can occur when levels of the medication are not high enough to suppress the virus in the blood.

Discussion

Benefits of Prevention

As previously mentioned, the United States spends vastly more for HIV/AIDS care and housing/cash assistance than towards prevention efforts. According to the CDC, the estimated lifetime cost of HIV antiretroviral treatment is \$379,668 (in 2010 dollars) per

HIV-infected individual. Various studies, both in the United States and internationally, have been conducted in terms of the cost-effectiveness of HIV/AIDS prevention strategies. In terms of VCT, a study on the cost-effectiveness showed that the cost of averting an HIV infection in a similar group costs between \$249 and \$346 (Sweat et al., 2000). For needle/syringe exchange, two studies in the United States estimated the cost-effectiveness as \$20,974 per HIV infection averted and \$34,278 per HIV infection averted, respectively (Holtgrave, Pinkerton, Jones, Lurie, & Vlahov, 1998; Laufer, 2001). This estimate may be high as the CDC estimates the cost of NEPs to be \$4000 - \$12,000 per HIV infection averted (C. f. D. C. a. Prevention, 2005). In terms of the cost benefit of condom distribution, a review of published studies suggests that the cost of averting an HIV infection through condom distribution is approximately \$12-\$17 (as of 2000) (Creese et al., 2002). Thus, through increased funding and implementation of prevention strategies by the federal government, it is conceivable that potentially hundreds of millions, if not billions, of dollars could be reduced from the budget earmarked for HIV/AIDS care and assistance.

Barriers to Implementation and Strategies to Overcome Them

There are potential obstacles to these recommendations, however. A phenomenon, known as NIMBY (Not In My BackYard), describes the resistance of communities to allocate land and physical resources to potential controversial programs (Takahashi, 1997). One of the programs that would be potentially affected by NIMBY would be needle/syringe exchange. There has been intense controversy, over NEPs in the United States as to whether these programs encourage drug use and whether they inherently convey a message to youth condoning drug use behavior (Vlahov & Junge, 1998). As injecting drug

use/abuse and homelessness tend to be localized in metropolitan, “inner city” areas, many individuals have schema of these areas of criminals and violence, and many involve persons of color (Takahashi, 1997). Many individuals are afraid that by establishing needle/syringe exchange centers or homeless shelters, that certain ills will be brought in the community.

To overcome the NIMBY phenomenon in terms of needle/syringe exchange, evidence-based educational efforts need to be administered to the entire United States population. A study in Amsterdam showed that between 1981 and 1986 (NEPs were introduced in Amsterdam in 1984), the percentage of injecting drug users under the age of 22 decreased from 14% to 5% (Vlahov & Junge, 1998). Similarly, no overall increase in injecting drug use was observed in this study among the entire drug-using population (Vlahov & Junge, 1998). Efforts against NIMBY in other arenas such as domestic utilities, have suggested that planning, program infrastructure, and communication are paramount to overcoming community resistance (Severson, 2012). Identifying and understanding parameters within the community such as social and cultural dynamics as well as the sense of community well-being are paramount to a project manager in developing implementation strategies and getting buy-in from community advocates (Severson, 2012). Assurances and provisions to ensure individual security, having the ability to make choices pertinent to the project, as well as the ability to predict of the future effects of the project on the community are all vital in maintaining the community well-being (Severson, 2012).

Another barrier that exists is the continued social perception and stigmatization of those with HIV/AIDS and those most at risk for acquisition of HIV/AIDS. Stigma can take on many different embodiments: isolation, ridicule, verbal/physical abuse, and termination

of employment (Pulerwitz, Michaelis, Weiss, Brown, & Mahendra, 2010). Much of the stigma results from ignorance about the disease and the ways that it is transmitted. Even today, many individuals believe that HIV/AIDS can be spread by touching an infected individual, sitting on a toilet seat after an infected individual, or eating/drinking after an infected individual. Furthermore, a study in 1999 revealed the 1 in 5 people “feared” someone with HIV/AIDS and 1 in 6 people were “disgusted” by a person with HIV/AIDS (Valdiserri, 2002). The effect of stigma on the marginalized populations can be extremely detrimental to prevention efforts. Stigma can be internalized by the individual which can lead to negative behaviors (Valdiserri, 2002). Stigma can lead to lower self-esteem in these individuals which could lead to devaluation of one’s life and thus engagement in riskier sexual behaviors (Valdiserri, 2002). Additionally, lower self-esteem can lead to increased incidence of alcohol and drug abuse which can lead to inhibition and riskier sexual encounters and encounters with multiple, random partners (Valdiserri, 2002).

One of the primary ways of reducing stigma is through education (Valdiserri, 2002). Public service announcements and advertisements utilizing well-known community leaders and celebrities on major media outlets such as newspaper, television, and radio would be accessible and credible to a large portion of the target population. Education efforts about HIV/AIDS should begin earlier in educational settings – around the time of sexual education curricula is being taught. This will help to dispel the rumors and myths about how HIV is transmitted and the ways that individuals can protect themselves against becoming infected. In terms of VCT, education efforts should be focused towards health care providers and those providing counseling as to how to best relate to and convey important health information to marginalized groups such as MSM and the transgender

community (Valdiserri, 2002). This will help to build rapport and trust between the high risk groups and health care providers. Finally, the condemnation of marginalized populations, such as gay/lesbian/MSM, by conservative religious groups should be countered by inclusion-promoting community messages utilizing community leaders and celebrities. These messages should advocate acceptance of all people, regardless of religion, race, and sexual orientation and the frequency of these messages should be increased through all media outlets: television, radio, social media, etc.

A final barrier to implementation that is isolated to needle/syringe exchange is the continued ban on the use of federal funding for NEPs. As previously mentioned, studies in other countries have shown that the existed of NEPs do not promote or increase IDU. Despite these studies to the contrary, the issue is still hotly debated and lawmakers ensure that the ban remains in effect. To overcome this misguided ban, particular effort will need to be made towards informing the population through educational campaigns. Once again, education should be evidence-based and messages should be conveyed through all media outlets.

Implementation of Prevention through Social Marketing Principles

The concept of social marketing can be a useful approach to overcoming the barriers that are presented above. Social marketing, as defined by Kotler and Zaltman, is “the design, implementation, and control of programs calculated to influence the acceptability of social ideas and involving considerations of product planning, pricing, communication, distribution, and marketing research (Cheng, Kotler, & Lee, 2009). In essence, it is applying marketing principles and techniques to create, communicate, and provide value to

influence behavior toward an individual and societal benefit (Cheng et al., 2009). The four basic tenets of social marketing, or 4Ps, are: product, price, place, and promotion (Grier & Bryant, 2005). Through social marketing, one could potentially develop a nationwide campaign with federal funds that could encompass all of the recommendations above with the expected result of increased HIV/AIDS prevention through risk reduction and access to antiretroviral treatment. One very specific example of social marketing in HIV/AIDS prevention has been its application in increasing the availability of and promoting proper condom use; which has been given the name condom social marketing, or CSM (R. t. Prevention, 2011). While CSM first started for global family planning, it was expanded as an early response to the HIV/AIDS epidemic internationally, and in particular, developing countries, to ensure a steady supply of condoms to those most at risk. While CSM is just one example of successfully employing social marketing, the social marketing principles may also be extended to the other HIV/AIDS prevention recommendations outlined above.

Product

To make additional counseling services for HIV positive individuals most effective and credible, community advocates and leaders should be recruited to run and staff these services. These individuals would best know how to effectively recruit and communicate with the target population that they serve. A model for the implementation of such counseling services could be the ONE CALL, a toll-free call center in North Carolina staffed by trained nurses designed to provide accurate information and referrals to care service to HIV positive individuals and health care providers (Medicine, 2013). Similarly, by linking these counseling services with existing programs such as the AIDS Drug Assistance

Programs, individuals who are diagnosed as HIV positive would be able to enter treatment protocols sooner, thereby improving their outcomes by lowering their viral loads, or amount of virus in the body, and maintaining high CD4+ T-cell numbers. As mentioned, by lowering the viral load, one also effectively reduces the transmission frequency to an uninfected individual. For condom distribution, public health leaders should work with condom manufacturers to develop design and packaging that will appeal to the target audience: high-risk individuals such as MSM and the transgender community. This particular strategy is embraced by the CSM campaign in developing countries (R. t. Prevention, 2011). By designing a product that is attractive to the target audience, presumably use will increase. Similarly, design and packaging for NEPs can be useful in advertising and advocating use of the program. By printing messages reminding users to return and recycle used needles/syringes.

Price

By leveraging federal government funding, pricing for VCT, condom distribution, needle/syringe exchange, and ARVs should be affordable to the at-risk population in the community. Federal government funding can be used to subsidize the manufacturers of condoms, needles/syringes, and ARVs which should help in lowering the cost to the consumer. Low cost items such as condoms and needles/syringes should be provided at no or very low cost to the target population. Other items, such as ARVs, should be priced to be commensurate with the average income levels of the targeted communities. One way of doing this would be to have a tiered approach based on income level whereby an individual would pay a certain price based on his/her reported income.

Place

One of 4Ps of social marketing relates to “place”. It has been shown that for VCT to be most effective, community based strategies should be employed over traditional health care settings (Suthar et al., 2013). This would mean offering VCT in areas like bars, shopping malls, community centers, and entertainment venues to reach a larger percentage of the at-risk population. By setting up VCT centers in these locations, high risk individuals can receive anonymous and confidential HIV testing without the potential barrier of accessing health care facilities. The community-based strategy could also work for condom distribution. By increasing the distribution of free or low-cost condoms in areas like bars, shopping malls, community centers, and entertainment venues, one reduces the barrier to access thereby reaching a larger target audience. In terms of needle/syringe exchange, programs could be established in local pharmacies which would also serve to decrease the barrier to access. Studies in other countries have shown effectiveness of this method. Additionally, 24-hour needle/syringe exchange venues will allow for users to utilize services anytime, especially during the peak hours of IDU.

Promotion

For any of the recommendations to be successful, educational and advertising campaigns targeting the entire United States population need to be implemented. For these efforts to be most effective, campaigns should be broadcast in multiple media formats: television, radio, social media (Facebook and Twitter), newspaper, magazines, etc. By utilizing multiple media formats, a greater percentage of the target population can be

reached. Additionally, celebrities such as television/movie stars and sports figures should be utilized to advocate items such as adherence to antiretroviral treatment and what to expect while on antiretroviral treatment (i.e. side effects), usage of condoms, not sharing needles/syringes, and getting tested to know your HIV status. These voices will lend credibility and authenticity to the message being presented. Additionally, promotion can be achieved through educational efforts in school. Topics such as the proper use of condoms and sexually transmitted diseases and testing can be entwined into sexual education curricula in the classroom.

Conclusion

The HIV epidemic continues to be a challenge for public health 30 years after the first infections were identified. While much more is known now in terms of viral pathogenesis and transmission dynamics, new infections continue to occur and disproportionately affect certain populations (African-American males, MSM, individuals engaging in IDU). As there has yet to be a protective vaccine developed, prevention efforts are and will be paramount to controlling and ultimately ending the epidemic. Despite the fact that the burden of the global pandemic lies in other regions of the world, in some regards, the United States' efforts to combat the disease on its own soil have paled in comparison to those internationally. By carefully examining prevention efforts by these countries and the lessons learned from their successes and implementing some of the same programs, the United States has the opportunity to drastically reduce the number of new HIV infections domestically. This will require a change in mentality on several levels

including the government, public health and health care sectors, the uninfected population, and the HIV positive population.

References

- Administration, U.S. Food and Drug. (2012). Truvada approved to reduce the risk of sexually transmitted HIV in people who are not infected with the virus. Retrieved 30/SEP/13, 2013, from <http://www.fda.gov/forconsumers/byaudience/forpatientadvocates/hivandaidsactivities/ucm312264.htm>
- Anderson, P. L., Glidden, D. V., Liu, A., Buchbinder, S., Lama, J. R., Guanira, J. V., . . . iPrEx Study, Team. (2012). Emtricitabine-tenofovir concentrations and pre-exposure prophylaxis efficacy in men who have sex with men. *Sci Transl Med*, 4(151), 151ra125. doi: 10.1126/scitranslmed.3004006
- AVERT. (2013a). Antiretroviral Drugs: Approved antiretroviral drugs. Retrieved 29/SEP/13, 2013, from <http://www.avert.org/antiretroviral-drugs.htm>
- AVERT. (2013b). Origin of HIV & AIDS. Retrieved 30/SEP/13, 2013, from <http://www.avert.org/origin-hiv-aids.htm>
- Bailes, E., Gao, F., Bibollet-Ruche, F., Courgnaud, V., Peeters, M., Marx, P. A., . . . Sharp, P. M. (2003). Hybrid origin of SIV in chimpanzees. *Science*, 300(5626), 1713. doi: 10.1126/science.1080657
- Beaubien, Jason. (2013). After Missteps In HIV Care, South Africa Finds Its Way. <http://www.npr.org/blogs/health/2013/08/27/215734826/after-missteps-in-hiv-care-south-africa-finds-its-way>
- Brook, I. (1987). Approval of zidovudine (AZT) for acquired immunodeficiency syndrome. A challenge to the medical and pharmaceutical communities. *JAMA*, 258(11), 1517.
- Cheng, Hong, Kotler, Philip, & Lee, Nancy R. (2009). *Social Marketing for Public Health: An Introduction*. Retrieved from http://samples.jbpub.com/9780763757977/57977_ch01_final.pdf
- Choopanya, K., Martin, M., Suntharasamai, P., Sangkum, U., Mock, P. A., Leethochawalit, M., . . . Bangkok Tenofovir Study, Group. (2013). Antiretroviral prophylaxis for HIV infection in injecting drug users in Bangkok, Thailand (the Bangkok Tenofovir Study): a randomised, double-blind, placebo-controlled phase 3 trial. *Lancet*, 381(9883), 2083-2090. doi: 10.1016/S0140-6736(13)61127-7
- Clinic, Mayo. (2013). HIV/AIDS: Causes. Retrieved 27/SEP/13, 2013, from <http://www.mayoclinic.com/health/hiv-aids/DS00005/DSECTION=causes>
- Cohen, M. S., Chen, Y. Q., McCauley, M., Gamble, T., Hosseinipour, M. C., Kumarasamy, N., . . . Team, Hptn Study. (2011). Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med*, 365(6), 493-505. doi: 10.1056/NEJMoa1105243
- Creese, A., Floyd, K., Alban, A., & Guinness, L. (2002). Cost-effectiveness of HIV/AIDS interventions in Africa: a systematic review of the evidence. *Lancet*, 359(9318), 1635-1643. doi: 10.1016/S0140-6736(02)08595-1
- Crisis, Gay Men's Health. (2009). Syringe exchange programs around the world: The global context.
- Denison, J. A., O'Reilly, K. R., Schmid, G. P., Kennedy, C. E., & Sweat, M. D. (2008). HIV voluntary counseling and testing and behavioral risk reduction in developing countries: a meta-analysis, 1990--2005. *AIDS Behav*, 12(3), 363-373. doi: 10.1007/s10461-007-9349-x

- Development, US Department of Housing and Urban. (2013). Housing Opportunities for Persons with AIDS (HOPWA) Program. Retrieved 29/SEP/13, 2013, from http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/aids_housing/programs
- Efficacy of voluntary HIV-1 counselling and testing in individuals and couples in Kenya, Tanzania, and Trinidad: a randomised trial. The Voluntary HIV-1 Counseling and Testing Efficacy Study Group. (2000). *Lancet*, 356(9224), 103-112.
- Ennett, S. T., Federman, E. B., Bailey, S. L., Ringwalt, C. L., & Hubbard, M. L. (1999). HIV-risk behaviors associated with homelessness characteristics in youth. *J Adolesc Health*, 25(5), 344-353.
- Foundation, Kaiser Family. (2013a, 23/MAY/13). U.S. Federal Funding for HIV/AIDS: The President's FY 2014 Budget Request. Retrieved 29/SEP/13, 2013, from <http://kff.org/hivaids/fact-sheet/u-s-federal-funding-for-hivaids-the-presidents-fy-2014-budget-request/>
- Foundation, Kaiser Family. (2013b, 25/MAR/13). The U.S. President's Emergency Plan for AIDS Relief (PEPFAR). Retrieved 24/OCT/13, 2013, from <http://kff.org/global-health-policy/fact-sheet/the-u-s-presidents-emergency-plan-for/>
- Gao, F., Bailes, E., Robertson, D. L., Chen, Y., Rodenburg, C. M., Michael, S. F., . . . Hahn, B. H. (1999). Origin of HIV-1 in the chimpanzee Pan troglodytes troglodytes. *Nature*, 397(6718), 436-441. doi: 10.1038/17130
- Grant, R. M., Lama, J. R., Anderson, P. L., McMahan, V., Liu, A. Y., Vargas, L., . . . iPrEx Study, Team. (2010). Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med*, 363(27), 2587-2599. doi: 10.1056/NEJMoa1011205
- Grier, Sonya, & Bryant, Carol A. (2005). Social Marketing in Public Health. *Annu. Rev. Public Health*, 26, 319-339. doi: 10.1146/annurev.publhealth.26.021304.144610
- Higgins, D. L., Galavotti, C., O'Reilly, K. R., Schnell, D. J., Moore, M., Rugg, D. L., & Johnson, R. (1991). Evidence for the effects of HIV antibody counseling and testing on risk behaviors. *JAMA*, 266(17), 2419-2429.
- Holtgrave, D. R., Pinkerton, S. D., Jones, T. S., Lurie, P., & Vlahov, D. (1998). Cost and cost-effectiveness of increasing access to sterile syringes and needles as an HIV prevention intervention in the United States. *J Acquir Immune Defic Syndr Hum Retrovirol*, 18 Suppl 1, S133-138.
- Homeless, National Coalition for the. (2009). HIV/AIDS and Homelessness. Retrieved 29/SEP/13, 2013, from <http://www.nationalhomeless.org/factsheets/hiv.html>
- Hurley, S. F., Jolley, D. J., & Kaldor, J. M. (1997). Effectiveness of needle-exchange programmes for prevention of HIV infection. *Lancet*, 349(9068), 1797-1800. doi: 10.1016/S0140-6736(96)11380-5
- International, Harm Reduction. (2011). U.S. reinstates federal funding ban for needle and syringe exchange programmes. Retrieved 30/SEP/13, 2013, from <http://www.ihra.net/contents/1154>
- Joint United Nations Programme on HIV/AIDS, UNAIDS. (2013a). Around 10 million people living with HIV now have access to antiretroviral treatment.
- Joint United Nations Programme on HIV/AIDS, UNAIDS. (2013b). Global report: UNAIDS report on the global AIDS epidemic 2013.
- Kidder, D. P., Wolitski, R. J., Campsmith, M. L., & Nakamura, G. V. (2007). Health status, health care use, medication use, and medication adherence among homeless and

- housed people living with HIV/AIDS. *Am J Public Health*, 97(12), 2238-2245. doi: 10.2105/AJPH.2006.090209
- Laufer, F. N. (2001). Cost-effectiveness of syringe exchange as an HIV prevention strategy. *J Acquir Immune Defic Syndr*, 28(3), 273-278.
- Losina, E., Schackman, B. R., Sadownik, S. N., Gebo, K. A., Walensky, R. P., Chiosi, J. J., . . . Freedberg, K. A. (2009). Racial and sex disparities in life expectancy losses among HIV-infected persons in the united states: impact of risk behavior, late initiation, and early discontinuation of antiretroviral therapy. *Clin Infect Dis*, 49(10), 1570-1578. doi: 10.1086/644772
- Lurie, P., & Drucker, E. (1997). An opportunity lost: HIV infections associated with lack of a national needle-exchange programme in the USA. *Lancet*, 349(9052), 604-608. doi: 10.1016/S0140-6736(96)05439-6
- Medicine, UNC Healthcare and UNC School of. (2013, 25/JUN/13). New HIV Call Center will link HIV patients to life-saving care. Retrieved 01/OCT/13, 2013, from <http://news.unchealthcare.org/news/2013/june/new-hiv-call-center-will-link-patients-to-life-saving-care>
- Murphy, E. M., Greene, M. E., Mihailovic, A., & Olupot-Olupot, P. (2006). Was the "ABC" approach (abstinence, being faithful, using condoms) responsible for Uganda's decline in HIV? *PLoS Med*, 3(9), e379. doi: 10.1371/journal.pmed.0030379
- Organization, World Health. (2013a). Global Health Observatory Data Repository: Data on the size of the HIV/AIDS epidemic: Prevalence of HIV among adults aged 15 to 49 (%) by country. Retrieved 30/SEP/13, 2013, from <http://apps.who.int/gho/data/node.main.622?lang=en>
- Organization, World Health. (2013b). HIV/AIDS. Retrieved 25/SEP/13, 2013
- Organization, World Health. (2013c). HIV/AIDS: Dramatic progress achieved in global HIV response since 2001. Retrieved 29/SEP/13, 2013, from <http://www.who.int/hiv/en/>
- Organization, World Health. (2013d, July 2013). Media centre: The top 10 causes of death. Retrieved 30/SEP/13, 2013, from <http://who.int/mediacentre/factsheets/fs310/en/>
- Prevention, Centers for Disease Control and. (2001). MMWR: Revised Guidelines for HIV Counseling, Testing, and Referral (Vol. 50, pp. 1-58).
- Prevention, Centers for Disease Control and. (2005). *Syringe Exchange Programs*. Retrieved from http://www.cdc.gov/idu/facts/aed_idu_syr.pdf
- Prevention, Centers for Disease Control and. (2010a, 25/MAR/10). HIV Transmission. Retrieved 09/OCT/13, 2013, from <http://www.cdc.gov/hiv/resources/qa/transmission.htm>
- Prevention, Centers for Disease Control and. (2010b). Persons living with diagnosed HIV. from http://gis.cdc.gov/GRASP/NCHHSTPAtlas/main.html?s_cid=nchhstp-atlas-005
- Prevention, Centers for Disease Control and. (2013a). Condom Distribution as a Structural Level Intervention: Scientific Support for Condom Distribution. Retrieved 25/OCT/13, 2013, from <http://www.cdc.gov/hiv/prevention/programs/condoms/>
- Prevention, Centers for Disease Control and. (2013b). Gay and Bisexual Men's Health: Mental Health. Retrieved 28/SEP/13, 2013, from <http://www.cdc.gov/msmhealth/mental-health.htm>

- Prevention, Centers for Disease Control and. (2013c, 29/APR/13). HIV/AIDS: Basic Statistics. Retrieved 28/SEP/13, 2013, from <http://www.cdc.gov/hiv/basics/statistics.html>
- Prevention, Centers for Disease Control and. (2013d, 23/APR/13). HIV/AIDS: HIV in the United States: At a Glance. Retrieved 27/SEP/13, 2013, from <http://www.cdc.gov/hiv/statistics/basics/ataglance.html>
- Prevention, Research to. (2011). Condom Social Marketing: Rigorous Evidence - Usable Results.
- Pulerwitz, J., Michaelis, A., Weiss, E., Brown, L., & Mahendra, V. (2010). Reducing HIV-related stigma: lessons learned from Horizons research and programs. *Public Health Rep*, 125(2), 272-281.
- Schackman, B. R., Gebo, K. A., Walensky, R. P., Losina, E., Muccio, T., Sax, P. E., . . . Freedberg, K. A. (2006). The lifetime cost of current human immunodeficiency virus care in the United States. *Med Care*, 44(11), 990-997. doi: 10.1097/01.mlr.0000228021.89490.2a
- Services, North Carolina Department of Health and Human. (2013). ADAP Fact Sheet.
- Services, US Department of Health and Human. (2013a). HIV/AIDS 101: A Timeline of AIDS. Retrieved 30/SEP/13, 2013, from <http://aids.gov/hiv-aids-basics/hiv-aids-101/aids-timeline/>
- Services, US Department of Health and Human. (2013b). HRSA: HIV/AIDS Programs: Legislation. Retrieved 29/SEP/13, 2013, from <http://hab.hrsa.gov/about/hab/legislation.html>
- Severson, G. (2012). Public relations: Managing NIMBY issues before they manage you. *Natural Gas and Electricity*, 29(5), 18-22. doi: 10.1002/gas.21653
- Stimson, G. V. (1989). Syringe-exchange programmes for injecting drug users. *AIDS*, 3(5), 253-260.
- Suthar, A. B., Ford, N., Bachanas, P. J., Wong, V. J., Rajan, J. S., Saltzman, A. K., . . . Baggaley, R. C. (2013). Towards universal voluntary HIV testing and counselling: a systematic review and meta-analysis of community-based approaches. *PLoS Med*, 10(8), e1001496. doi: 10.1371/journal.pmed.1001496
- Sweat, M., Gregorich, S., Sangiwa, G., Furlonge, C., Balmer, D., Kamenga, C., . . . Coates, T. (2000). Cost-effectiveness of voluntary HIV-1 counselling and testing in reducing sexual transmission of HIV-1 in Kenya and Tanzania. *Lancet*, 356(9224), 113-121. doi: 10.1016/S0140-6736(00)02447-8
- Takahashi, L. M. (1997). The socio-spatial stigmatization of homelessness and HIV/AIDS: toward an explanation of the NIMBY syndrome. *Soc Sci Med*, 45(6), 903-914.
- Thiede, H., Valleroy, L. A., MacKellar, D. A., Celentano, D. D., Ford, W. L., Hagan, H., . . . Young Men's Survey Study, Group. (2003). Regional patterns and correlates of substance use among young men who have sex with men in 7 US urban areas. *Am J Public Health*, 93(11), 1915-1921.
- Valdiserri, R. O. (2002). HIV/AIDS stigma: an impediment to public health. *Am J Public Health*, 92(3), 341-342.
- Vlahov, D., & Junge, B. (1998). The role of needle exchange programs in HIV prevention. *Public Health Rep*, 113 Suppl 1, 75-80.

- Volberding, Paul A., & Deeks, Steven G. (2010). Antiretroviral therapy and management of HIV infection. *The Lancet*, 376(9734), 49-62. doi: [http://dx.doi.org/10.1016/S0140-6736\(10\)60676-9](http://dx.doi.org/10.1016/S0140-6736(10)60676-9)
- Weinhardt, L., Carey, M.P., Johnson, B.T., & Bickham, N.L. (1999). Effects of HIV Counseling and Testing on Sexual Risk Behavior: A Meta-Analytic Review of Published Research, 1985-1997. *American Journal of Public Health*, 89(9), 9.
- Weller, S., & Davis, K. (2002). Condom effectiveness in reducing heterosexual HIV transmission. *Cochrane Database Syst Rev*(1), CD003255. doi: 10.1002/14651858.CD003255