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### Social Determinants of Health: Interventions that Improve Medication Adherence Among People Living With HIV/AIDS (PLWHA) in Sacramento County

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**Social Determinants of Health: Interventions that Improve Medication Adherence Among  
People Living With HIV/AIDS (PLWHA) in Sacramento County**

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Integrated Learning Experience (ILEX) – Summer 2022

MPH 683-28

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August 15, 2022

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## Abstract

Currently, there is still no cure available for the Human Immunodeficiency Virus (HIV). There are approximately 1.2 million people living with HIV/AIDS, and nearly 36,000 new HIV infections per year in the U.S alone (HIV.gov, 2021). Despite the development of highly effective medications presently used to treat HIV, rates of medication adherence are still low. This paper explores the interventions that improve medication adherence among people living with HIV/AIDS (PLWHA) in Sacramento County.

There were approximately 4,403 people living with HIV/AIDS in Sacramento County in 2019, with 158 newly diagnosed in the same year. This high prevalence of HIV/AIDS in Sacramento County makes the county one of the 48 hotspot counties for HIV/AIDS in the U.S. (CDPH HIV/AIDS, 2021). In Sacramento County, the highest burden of HIV/AIDS is among people of color, men who have sex with men, and among the youth (CDPH HIV/AIDS, 2021). There was a decrease in the rate of viral suppression from 86.76% in 2020 to 85.96% in 2021 in Sacramento County, a setback in the efforts to reduce the transmission of HIV/AIDS in Sacramento County.

Based on surveyed literature on medication adherence, this paper recommends the adoption of multidisciplinary care teams to supplement patient-doctor interactions for individual people living with HIV/AIDS as a strategy to improve medication adherence and increase rates of viral suppression in Sacramento County. This paper also recommends addressing specific social determinants of health such as housing, food, and medication transportation assistance for PLWHA. Addressing the social determinants of health will incentivize STI testing, increase retention in care for PLWHA, and help patients achieve viral suppression. Ultimately, this

approach will most especially improve medication adherence among the economically and racially marginalized groups.

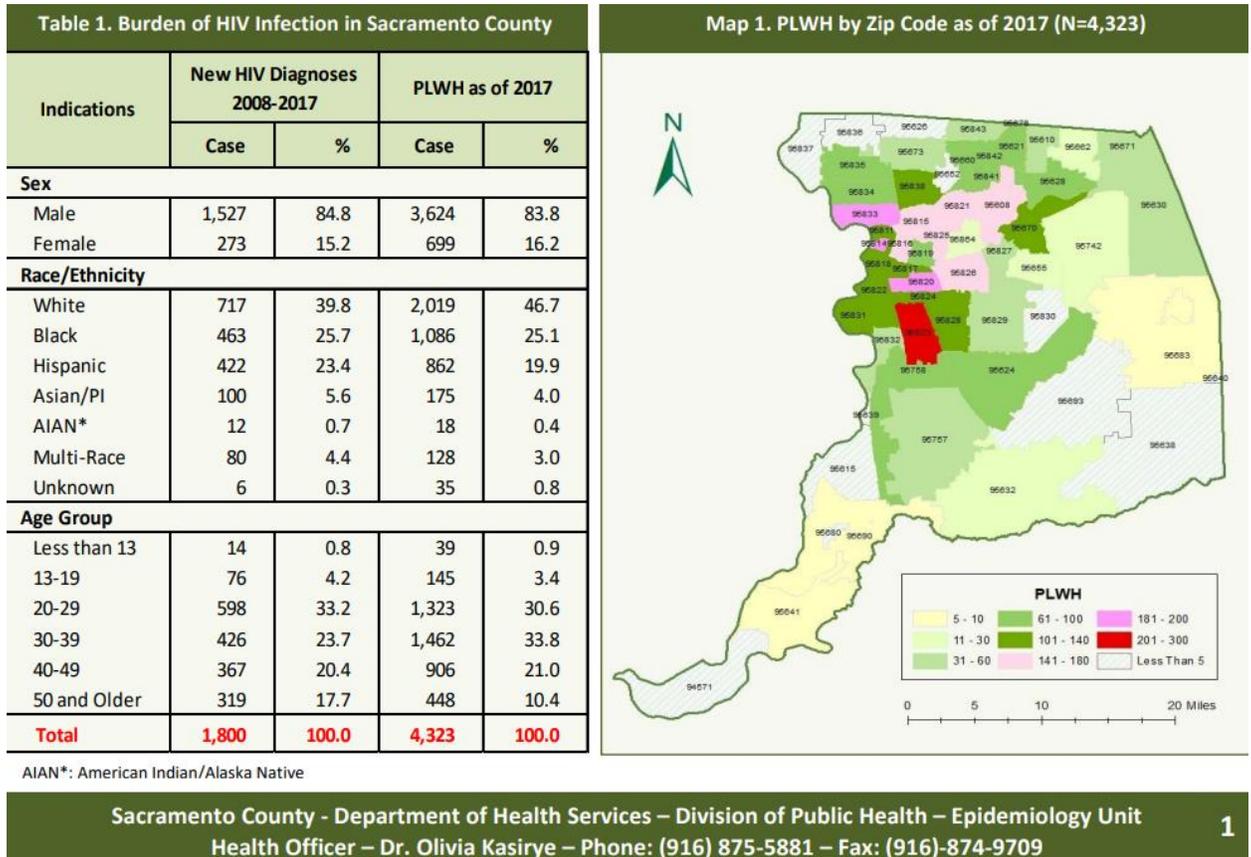
## Introduction

### Background and Literature Review

Globally, about 37.7 million people lived with HIV by the end of the year 2020, with 4% of this population living in the United States. There were about 1.5 million new HIV infections worldwide in the year 2020 according to UNAIDS (UNAIDS, 2022). In the United States, about 1.2 million people live with the Human Immunodeficiency Virus, 14% are not aware of their HIV status. There were approximately 37,000 new infections in the U.S. alone in 2018, with the biggest burden falling on the southern states of the U.S (HIV.gov, 2021).

According to the California Department of Public Health (CDPH), Sacramento County had a total of 4,403 People Living with HIV/AIDS (PLWHA) by the year 2019, 158 of whom were newly diagnosed in the same year (CDPH, 2021). It is important to note Sacramento County had a population of about 1,578,862 people by the year 2020 (Be Healthy Sacramento, 2022). The high burden of HIV makes Sacramento County one of the top hotspot counties for HIV/AIDS in the U.S. (AIDSVU, 2019). Of the 158 newly diagnosed PLWHA, 57% were people of color, while 21.2% were transitional youths ages 13-24. There appears to be a disproportionate impact of HIV among communities of color and youths in Sacramento County (CDPH, 2021). Black people accounted for over one fourth (26.7%) of new cases despite only making up about 12% of the County population. Nonetheless, the highest percentage of new cases (39.8%) of the newly diagnosed in 2019 were white people (Sacramento Department of Health Services, 2019).

Figure 1: Burden of HIV in Sacramento County (Sacramento Department of Health Services, 2017)



## HIV Progression

The window period for HIV is between two weeks and three months. Most people infected with HIV will develop acute flu-like symptoms two to twelve weeks after infection. People diagnosed with HIV need to be connected and retained in care to manage the HIV infection with Antiretroviral Therapy (ART). HIV will develop into the acquired immunodeficiency syndrome (AIDS) if left untreated, which makes victims vulnerable to life-threatening opportunistic infections (Prescott Chow, et al., 2020). HIV is most transmitted through six body fluids: blood, cum, precum, vaginal fluids, rectal fluids, and breast milk. These fluids are most transferred

between partners through unprotected sexual contact or through sharing equipment for injection drug use. HIV medications (Antiretroviral Therapy) reduce the risk of HIV transmission and control the HIV infection by slowing the progression of HIV to AIDS. Pre-exposure prophylaxis (PrEP) is part of the current HIV treatment and prevention strategy. PrEP is highly effective in reducing the risk of HIV transmission among at-risk populations when taken under the direction of a medical professional.

The current continuum of care for HIV/AIDS highlights the importance of getting tested, getting linked to care, staying in care, attaining viral suppression, and becoming undetectable (Rendina, et al., 2020). Achieving the undetectable status (viral load <20 copies/mL) is a very important part of the strategy to end the HIV epidemic in the United States and beyond. Only 67.9% of people living with HIV/AIDS in The U.S. were virally suppressed in the year 2010 (Cheever, L. 2021). Adherence to HIV medications and care makes PLWHA achieve the undetectable status, implying they cannot transmit HIV through sex. In other words, Undetectable = Untransmittable, or U=U (Beyrer, C., et al., 2021).

## **Current Interventions**

In August 1990, the U.S. Congress enacted the Ryan White Comprehensive AIDS Resources Emergency (CARE) Act, which provides Federal funding for HIV community-based care and treatment services. The program is managed by the U.S. Health Resources and Services Administration (HRSA). The CARE Act has been amended and reauthorized four times in 1996, 2000, 2006, and 2009. HRSA awards Ryan White grants to cities, states, counties, and community-based groups to provide HIV medical care, treatment, and support services for people with HIV; as well as to improve health outcomes and reduce the transmission of HIV (HRSA, 2020).

Currently, the Health Resources and Services Administration also runs a federal program called Ending the HIV Epidemic in the U.S. (EHE), which focuses on reducing the number of new HIV infections in the United States by at least 90% by the year 2030 (HRSA, 2022).

The Centers for Disease Control (CDC) coordinates HIV surveillance, prevention, and treatment efforts. The CDC 's continuum of HIV care emphasizes getting tested, getting linked to care, staying in care, achieving viral suppression, and becoming undetectable. The “Undetectable = Untransmittable” (“U = U”) campaign is backed by the Centers for Disease Control (CDC), which conveys the message of becoming undetectable to help end the stigma faced by PLWHA. The stigma around HIV/AIDs is still an obstacle to seeking HIV care. The U=U campaign creates awareness and protects the wellbeing of people living with HIV by encouraging them to adhere to medications and maintain the undetectable status and achieving optimum health. This ultimately addresses the public health goals of preventing HIV and ending the HIV epidemic in the United States (CDC, 2019).

Sacramento County department of public health supervises the operations of the Ryan White planning council which assesses the needs of people living with HIV in the transitional grant area (TGA) and establishes service priorities for PLWHA in the TGA. Transitional Grant Areas are designations of the Ryan White grant across the United States to ensure effective management of the grant at the federal level. The Ryan White planning council allocates federal funding to pay for the delivery of HIV/AIDS medical and support services for those who otherwise could not afford such services in the Sacramento TGA.

## Medication Adherence and Viral Suppression

HIV medication adherence is an important factor in reducing the HIV viral load among people living with HIV/AIDS and eliminating the transmission of HIV to uninfected partners (Tabrisky A.P., et al, 2021). By adhering to daily antiretroviral therapy (ART) medications, people living with HIV/AIDS can achieve viral suppression (Tchakoute, C.T., et al, 2022). Viral suppression allows people living with HIV/AIDS to live longer and healthier lives and eliminates the potential for further transmission to uninfected sexual partners. ART is also emphasized among people living with HIV/AIDS to reduce individual and community viral load and subsequent risk of transmission risk (Dangerfield et al., 2018). It is important to note that suboptimal medication adherence reduces the chances of suppressing the HIV viral load among PLWHA (Tabrisky A.P., et al, 2021). Suboptimal medication adherence occurs when a patient misses at least one dose of medication per month over the course of a three-month period. Suboptimal medication adherence among youth living with HIV/AIDS has led to poor health outcomes, increased drug resistance, reduced efficacy of existing treatment options, widened health disparities and the increased potential for transmission of a drug-resistant virus (Erguera X.A., et al, 2019).

PLWHA are considered virally suppressed when the most recent HIV viral load test result during the six months after diagnosis is  $\leq 200$  copies/ml. A person is considered undetectable when the most recent HIV viral load test result is  $\leq 20$  copies/ml (*CDPH-OA*, 2021). In 2021, the number of virally suppressed people in Sacramento (viral load  $\leq 200$ ) reduced from 86.76% in 2020 to 85.96% (Sacramento-tga, 2021). In 2019, the highest viral suppression in California was among men who have sex with men (71.8%) and the lowest was among men whose mode of transmission was via injection drug use (41.3%) over a six-month period (*CDPH-OA*, 2021).

Consistent medication adherence is also associated with both lower viral load levels and higher CD4 counts which emphasizes the benefits of taking medication adherence for PLWHA

(Tchakoute, C.T., et al, 2022). There are other benefits of HIV medication adherence. According to Weinstein et al., having an undetectable viral load for HIV is a driver of higher adherence for other medical procedures such as mammogram screening among women living with HIV/AIDS. Weinstein et al. concluded that a decrease in HIV medication adherence is correlated with a decline in other medical procedures (Weinstein et al., 2016).

Conversely, medication non-adherence has been reported to be the main barrier to successful HIV treatment and is a risk factor for the emergence of drug resistance (Tchakoute, C.T., et al, 2022). Among communities of color living with HIV/AIDS, colonial legacies of medicine, medical mistrust and HIV conspiracy beliefs are contributing factors to medication non-adherence. There is existing uncertainty, misinformation, and mistrust about various aspects of HIV, particularly among Black and Latinx communities that are borne from the legacies of institutional racism within medical research and treatment programs (Pasipanodya E.C. et al, 2021; Liu A.Y., et al, 2016; Mimiaga M.J., et al, 2020). Lower rates of medication adherence have been reported among black communities due to mistrust of the providers, privacy concerns, lower health literacy, and unmet medical and social-structural needs (Liu A.Y., et al, 2016; Mimiaga M.J., et al, 2020). Medical mistrust among the black community is fueled by historical context of unethical medical experimentation among the black community such as the U.S. Public Health Service Tuskegee Syphilis Study on Untreated Syphilis among black males in Tuskegee, Alabama (Brincks et al., 2019). When PLWHA do not trust physicians, health outcomes such as poor adherence to antiretroviral medications, and intensified psychological distress associated with treatment for HIV/AIDS have been reported (Brincks et al., 2019). For most communities of color, the mistrust in medical systems can lead to the reduced belief and understanding of the treatment benefits, and ultimately poor health care use (Brincks et al., 2019). It is critical to address medical

mistrust among the black PLWHA in Sacramento since black people account for over one fourth of new HIV cases despite only making up about 12% of Sacramento's population.

## **Barriers to Medication Adherence**

### *Medication Fatigue and side effects*

Several barriers to ART have been widely studied across the globe. Among the youths, barriers to medication adherence include forgetfulness to take the medications, being away from home, a change in daily routine, and mental health disorders such as depression, alcohol and substance abuse (Erguera X.A., et al, 2019). As a key component of the HIV continuum of care, successful medication adherence has also been affected by medication fatigue and side effects from the medications (Tabrisky A.P., et al, 2021). Youth are most at risk of poor medication adherence and hence higher risk of developing high viral loads, predisposing them to living with AIDS at a young age (Erguera X.A., et al, 2019). Mental health issues such as depression impeded the ability of young people to prioritize treatment adherence (Dangerfield L.D.T., et al, 2018). Individuals with depressive symptoms and suboptimal adherence are almost six times more likely to die than individuals without depressive symptoms who are adherent (Magidson J.F., et al, 2015).

### *HIV related stigma*

HIV related stigma can delay the connection to treatment and care, perpetuate denial of infection, and influence antiretroviral treatment use and adherence (Yi T., et al, 2011; Dangerfield L.D.T., et al, 2018). Perceived stigma due to sexual orientation and race is especially a barrier to medication adherence because it discourages the victims of HIV stigma from seeking care leading to poor retention in care (Brincks et al., 2019). Discrimination related to HIV diagnoses, physical and sexual abuse, and diagnoses of mental health disorders and sexually transmitted infections

among PLWHA has also contributed to HIV related stigma (Johnson et al., 2022). The stigma associated with HIV destabilizes medication adherence by compromising general psychological and social support and other adaptive coping mechanisms (Katz et al., 2013). Psychological processes and stigmatizing attitudes such as internalized stigma and concealment of HIV status also undermine HIV medication adherence (Katz et al., 2013). HIV stigma may prompt PLWHA to conceal their seropositivity from others to avoid the unpleasant backlash that may arise from revealing their status which increases the spread of HIV (Katz et al., 2013).

### *Smoking and substance use*

Smoking and using substances have been reported as a barrier to medication adherence. Smokers living with HIV/AIDS may have decreased adherence to medications than non-smokers (Yi T., et al, 2011). Individuals who use substances have been reported to have poorer HIV medication adherence than those not using substances (Mimiaga M.J., et al, 2020; Dangerfield L.D.T., et al, 2018). Marquez C., et al, concluded that the association between the use of methamphetamine and an increased number of sex partners and poor medication adherence demonstrates the role that substances play in HIV transmission and medication non-adherence (Marquez C., et al, 2009). Most PLWHA use substances as a coping mechanism to HIV stigma and mental health related conditions such as anxiety and depression. However, substance dependence further compromises the ability to consistently adhere to medications (Katz et al., 2013).

### *Sexual identity, race, and gender identification*

Sexual identity, race, and gender identification are barriers to medications adherence. Transgender women living with HIV are less likely to report higher adherence to antiretroviral therapy (ART) compared to other adults living with HIV (Glenda N.B., et al, 2016). ART

adherence has been associated with older age, abstinence from alcohol, positive gender affirmation and adherence to hormones among transgender women (Glenda N.B., et al, 2016). Black men who have sex with men have reported racism, perceived discrimination, and homophobia in healthcare settings, as barriers to HIV testing and treatment (Dangerfield L.D.T., et al, 2018). HIV-related stigma, homophobia within the black community, and racism from the white community contributed to the reluctance to get tested for HIV and increased non-disclosure of a positive HIV status to sexual partners (Dangerfield L.D.T., et al, 2018). The compounded effect provider transphobia and stigmatization of transgender people has contributed to the rise in medical mistrust among the transgender community (Watson C.W., et al, 2020). Transgender people of color, especially Black and Latino trans people must overcome barriers such as discrimination and intersectional stigma when seeking for HIV care and gender affirming care (Watson C.W., et al, 2020).

### *Other Social Determinants of Health*

The Weinstein et al. suggests social determinants of health such as lack of employment, low social support, and drug use, etcetera, have strong implications for HIV medication adherence and screening (Weinstein et al., 2016). Among racially diverse urban populations of HIV-infected women engaged in care, social determinants of health are drivers of medication adherence (Weinstein et al., 2016). Social support from family, friends, medical providers, or other social determinants of health to motivates medication adherence among people living with HIV (Pasipanodya E.C. et al, 2021).

Efforts to curb the HIV epidemic in the U.S. must identify factors that influence medication adherence among racially and ethnically diverse populations. These efforts must also improve Pre exposure prophylaxis (PrEP) utilization, and design effective interventions among under-

represented individuals at risk for acquiring HIV (Pasipanodya E.C. et al, 2021). Substance use and gender-based violence, for example, have been reported to hinder the uptake and adherence to medication among populations living with HIV/AIDS. Among the transgender community, there are disproportionately high rates of substance use, and violence which significantly affect medication adherence (Sevelius J.M., et al, 2021). Exposure to violence is a bigger driver of medication non-adherence than substance dependence (Sevelius J.M., et al, 2021). Drivers of medication non-adherence are exacerbated by mental health conditions such as depression. Individuals with depressive symptoms and suboptimal adherence are almost six times more likely to die from HIV related illnesses than individuals without depressive symptoms who are adherent (Magidson J.F., et al, 2015).

## Methods

A review of online literature on medication adherence among people living with HIV/AIDS in California/Sacramento County published between 2012 and 2022 was conducted using PubMed and other databases. Data was restricted to studies done in California and most specifically Sacramento County. A total of 38 articles published between 2012 and 2022 on PubMed were reviewed. These articles contained data on medication adherence trends and drivers of medication adherence among people living with HIV/AIDS. The search process included using search terms as well as the Mesh tool to collect all possible articles on this subject.

Searches included:

“(Sacramento[Title/Abstract] OR California[Title/Abstract]) AND (“Medication Adherence”[Mesh] OR adherence OR compliance OR adherent OR compliant) AND (HIV OR Antiretroviral OR ART OR HAART OR “Anti-Retroviral Agents”[Mesh] OR “Anti-HIV Agents”[Mesh] OR “CCR5 Receptor Antagonists”[Mesh] OR “HIV Fusion Inhibitors”[Mesh] OR “HIV Integrase Inhibitors”[Mesh] OR “HIV Protease Inhibitors”[Mesh] OR “HIV Infections/drug therapy”[Mesh] OR “HIV Infections”[Mesh])”

AND

“(Social determinants of health[Title/Abstract]) AND (Interventions[Title/Abstract]) AND (“Medication Adherence”[Mesh] OR adherence OR compliance OR adherent OR compliant) AND (HIV OR Antiretroviral OR ART OR HAART OR “Anti-Retroviral Agents”[Mesh] OR “Anti-HIV Agents”[Mesh] OR “CCR5 Receptor Antagonists”[Mesh])”

OR "HIV Fusion Inhibitors"[Mesh] OR "HIV Integrase Inhibitors"[Mesh] OR "HIV Protease Inhibitors"[Mesh] OR "HIV Infections/drug therapy"[Mesh] OR "HIV Infections"[Mesh])”

AND

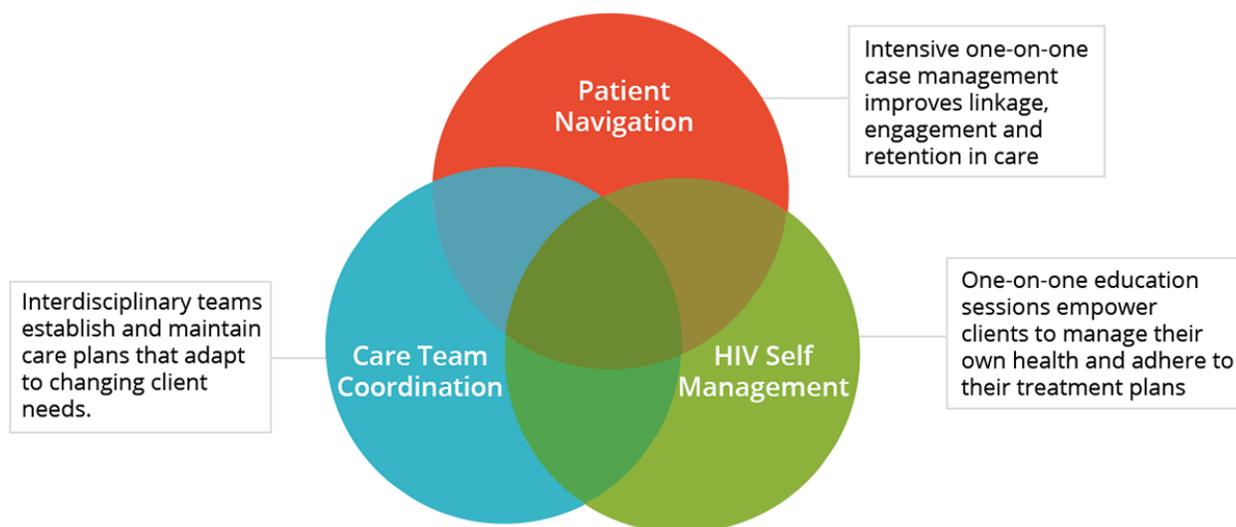
“(Interventions[Title/Abstract] AND (Sacramento[Title/Abstract] OR California[Title/Abstract]) AND ("Medication Adherence"[Mesh] OR adherence OR compliance OR adherent OR compliant) AND (HIV OR Antiretroviral OR ART OR HAART OR "Anti-Retroviral Agents"[Mesh] OR "Anti-HIV Agents"[Mesh] OR "CCR5 Receptor Antagonists"[Mesh] OR "HIV Fusion Inhibitors"[Mesh] OR "HIV Integrase Inhibitors"[Mesh] OR "HIV Protease Inhibitors"[Mesh] OR "HIV Infections/drug therapy"[Mesh] OR "HIV Infections"[Mesh])”

## **Recommendations**

### **Adopt Multidisciplinary Care Teams at the Implementation Level**

Multidisciplinary Care Teams (MDCTs) are the mechanism for organizing and coordinating health and care services to meet the needs of individuals with complex care needs such as PLWHA (Scie, 2018). MDCTs break disciplinary silos where historically, every profession has tended to work independently or semi-independently from other disciplines. It is a client-centered approach where MDCTs assess clients' unmet needs and collaboratively work together to meet those needs using a holistic approach to providing care. MDCTs are composed of infectious disease (ID) doctors, nurses, pharmacists, social workers, medical case managers, non-medical case managers, mental health clinicians and other health related disciplines. The purpose is for these teams to collaboratively communicate and work together to achieve optimum care and health of a patient. In 2012, Horberg M.A., et al. determined there were differences in care optimization among different MDCTS at several Kaiser Permanente facilities in California. When compared to the HIV specialist only, MDCTs were found to have statistically significantly greater ART adherence, suggesting that several MDCT combinations have a positive influence on adherence when compared to the HIV/ID specialist alone. The Horberg study found the highest mean improved adherence in the MDCT that include a pharmacist, non-medical case manager and a plus primary care clinician. Three other MDCT combinations that showed significantly improved adherence were: nurse, medical case manager and primary care clinician; pharmacist, medical case manager and a primary care clinician; and infectious disease specialist and mental health clinician. The study found no statistically significant difference among the different combinations (Horberg M.A., et al, 2012).

Figure 2: Roles played by Multidisciplinary Care Teams (CDC, 2022)



Due to their different scopes of practice, nurses, case managers, and social worker teams help address patient unmet needs and other social determinants of health which increases the likelihood of medication adherence. It is important to note that HIV care support teams often play a vital role in supporting PLWHA adhere to HIV medications than the HIV specialist. Prior studies have indicated that doctors (including infectious disease specialists) do not necessarily emphasize adherence in their patient interactions (Horberg M.A., et al, 2012). Medical case managers play crucial roles in improving access to care, increasing rates of retention in care, ensuring treatment plan adherence, and meeting patient unmet needs. Social workers arrange resources for meeting social needs such as housing, transportation, insurance benefits and medication availability.

To influence medication adherence, MDCTs are able to create varying degrees of routine and structure in a patient's daily life (Magidson J.F., et al, 2015). Higher rates of medication adherence are associated with changes in lifestyle structure and patterns of activity engagement. For example, changes in a patient's daily routine and the patient's ability to fit a treatment regimen into their daily routine consistently predicted medication adherence than other factors that affect adherence (Magidson J.F., et al, 2015).

## **Implementation strategy for MDCTs**

PLWHA see a variety of health care providers in the health care system. For example, PLWHA must see infectious disease doctors who monitor disease progress and advise patients and medical case managers who navigate patients to social services and help them meet their needs. PLWHA also interact with primary care physicians who prescribe medications, pharmacists who refill medications, mental health clinicians to help patient deal with mental health issues associated with living with HIV/AIDS.

The recommendations suggested in this paper focus on creating a web of care where HIV providers get to know each other the same way PLWHA in Sacramento know their providers. Often care providers for PLWHA do not know each other which limits collaboration amongst each other. Using open house events among different local providers as a get together-get to know each other event, providers of health care for PLWHA in Sacramento will learn about each other's work, and devise means to cooperate both professionally and personally for the benefit of the mutually shared patients. The get together events would be hosted by the different providers who would take turns hosting the event every year. For most organizations, hosting get-together events is usually an internally planned event, which means it would add extra costs or require strenuous planning for the host organization to host other organizations. A major limitation to this idea is that many providers may not initially buy into this concept. But with time, it is anticipated they see the benefits of the get together events as mutually beneficial for their clients and come along.

Indicators of success in increasing medication adherence as pertains to this recommendation will be determined by documented follow up by assigned providers, of particularly identified patients in specific populations who may have high viral loads. It is anticipated that with care plans designed for individual patients with high viral loads, these patients adhere to their medications as

supervised by assigned care providers. With consistent medication adherence, it would take about six months for these patients to achieve viral suppression and become undetectable.

## **Address Social Determinants of Health**

### *Housing*

Affordable housing has been reported as the greatest barrier to HIV care and medication adherence (Sacramento-tga, 2021). In 2020, there were an estimated 161,548 people experiencing homelessness on any given day in California. A total of 9,278 individuals experiencing homelessness by the start of 2022, according to Sacramento Steps forward (Sacramento Steps Forward, 2022). In 2022, about 7.1 million Californians were housed but living in poverty, and 56% of that group were spending more than half of their paycheck on rent each month (CDPH, 2022). Housing is particularly stressful for individuals with low or no income, those having eviction histories, experiencing mental health issues, having criminal records, and those having current or past drug use (Sacramento-tga, 2021).

Unstable housing is a barrier to viral suppression (Wilson, E. C., et al, 2020). For PLWHA, housing is a critical need. About 39% of PLWHA in Sacramento reported housing as the biggest barrier to achieving complete medication adherence in 2021 (Sacramento-tga, 2021). Housing is necessary to keep PLWHA in HIV medical care and to support their ambulatory medical care needs. In a 2021 survey, 22% of young adult PLWH in Sacramento reported they were currently homeless or unstably housed in shelters or motels (Sacramento-tga, 2021). This was slightly higher than in 2018 where 18.7% of respondents reported homelessness or unstable housing. As the pandemic and various restrictions exacerbated the scarcity for affordable housing, the need for mental health services, food vouchers, and housing assistance also increased (Sacramento-tga,

2021). Since approximately 70.81% of PLWHA in Sacramento live at or below 138% of the federal poverty level, more resources will be needed to meet the needs of PLWHA in the region (Sacramento-tga, 2021).

### ***Food Assistance***

For many PLWHA not making enough money to buy food and pay bills, not having enough food can be a barrier to medication adherence. To these people, they must make difficult choices between buying food to eat to facilitate medication adherence and paying the most urgent bill to survive getting cut off from basic services. In 2021, Sacramento County reported experiencing a significant increase in clients seeking housing and food bank services (Sacramento-tga, 2021). As the pandemic and pandemic-related restrictions continued into 2022, need for mental health services and food assistance to maintain HIV medical care and medication adherence increased (Sacramento-tga, 2021).

### ***Medical Transportation Assistance***

Field-based medical case management provides transportation assistance to PLWHA and is a critical component of retaining PLWHA in care. Case managers are able go to the clients' homes for visits rather than requiring clients to travel to them, which reduces the transportation costs and helps overcome the transportation barriers (Sacramento-tga, 2021). In Sacramento County, inadequate medical transportation assistance has been reported as the second biggest barrier to HIV care and consequently medication adherence (Sacramento-tga, 2021). Although the bus and light-rail systems are available in the greater Sacramento area, the outskirts of Sacramento city have little reach to the public transportation system (Sacramento-tga, 2021). The lack of transportation to doctor's visits may cause insufficient doctor's visits and an inadequate supply of ART medications or refills, which could perpetuate medication nonadherence among PLWHA.

The high costs of transportation to health care appointments may be a barrier to achieving medication adherence.

### **Implementation strategy**

There is a patchwork of services addressing the social determinants of health among PLWHA in Sacramento County. While some providers apply for grants and secure funding to address needs such as housing through federal grants like HOPWA (Housing Opportunity for people Living With HIV/AIDS), other providers do not. This overwhelms the providers that offer those services. My recommendation aims at streamlining funding associated with the social determinants of health so that if providers share the same geographical area of clients, they divide amongst themselves who provides what service so that a single provider is not overwhelmed with providing too many services than other providers. If providers do not share the same geographical area, then those providers should be able to recruit more staff to have the needs of their client where they are the sole providers of those services. Measures of success will depend on the number and distribution of grants targeting the specific social determinants of health in the geographical areas.

## **Implications and Discussion**

Multiple disciplinary care team members play an integral role in ensuring that HIV treatment is successful. Coordinated care from multidisciplinary teams improves the rates of medication adherence and improves other health outcomes too. Given their different professional backgrounds, multidisciplinary care teams implement holistic approaches to administer care plans and individual service plans for PLWHA. The different disciplines can examine different comorbidities of HIV at the same time, and design treatment plans for individual PLWHA.

If they adopted as an HIV care strategy, multidisciplinary care teams will have a significant impact on medication adherence due to their ability to supplement patient-doctor interactions for individual PLWHA. While many doctors may not necessarily emphasize adherence in their patient interactions, multidisciplinary care teams collaboratively supplement patient-doctor interactions. Inadequate patient-doctor interactions have created an information gap for patients which in turn contributes to low medication adherence rates.

HIV specialists and mental health clinicians will be able to fully address the significant impacts of medications for both HIV as well as psychiatric medications on the patient's ability to adhere to treatment plans and regimens. For ART, multidisciplinary care teams will be able to expedite medication access after diagnosis and during continued care visits. Multidisciplinary care teams will also work together to provide linkage to care after diagnosis for HIV or to an infectious disease specialist during treatment. The collaborative effort among the different disciplines that care for PLWHA will improve patient adherence to knowledge about HIV prevention strategies.

Multidisciplinary care teams will educate patients on the role that PLWHA plays toward reducing the spread of HIV, a vital part of ending the HIV epidemic. They can use financial

incentives to support medication adherence which will allow economically vulnerable individuals to afford other basic needs such as utility bills and transportation to medical appointments.

The high cost of transportation to health care appointments contributes toward medication non-adherence among poor people. Therefore, providing medical transportation assistance to financially incentivize HIV/AIDS testing, retention in care, and achieving viral suppression will improve medication adherence, especially among economically and racially marginalized groups. Medical transportation assistance will also improve health outcomes among people whose medical provider is too far from where they live, and they cannot afford transportation because of low pay because they cannot take time off work or because they cannot afford childcare.

For people with a history of homelessness, financial incentives such as food assistance and medical transportation assistance are especially important to improve medication adherence and can be the difference between being a house and facing housing insecurity.

## **Limitations**

Multidisciplinary care teams may not effectively collaborate to improve health outcomes among PLWHA. Successful multidisciplinary care teams use their specialized knowledge and high efficiency to perform different tasks to solve patient health problems. A lack of collaboration, which is often caused by inadequate communication channels and bureaucracy may cause failures in teamwork which may lead to misunderstanding of individual patient situations. The Successful collaboration seeks to ask probing questions about the problem, make assessments, and ultimately make relevant recommendations after group discussions of any given case.

Addressing the targeted social determinants of health will be limited by unsuccessful grant applications to fund specific programs in the geographical area, which may skew the distribution of resources toward certain geographical areas than others. Another limitation is that this literature review does not put into consideration the impact of Covid-19 on medication adherence in Sacramento County.

### **Future research**

The impact of substance addiction and homelessness on medication adherence in Sacramento County. There are gaps in the literature on the compounded impact of substance use or homelessness on HIV medication adherence. Documenting the compounded impact of either of these factors in addition to living with HIV/AIDS will highlight the intersection of barriers to overcoming HIV stigma, addiction, and living with the HIV virus. This will increase awareness of the impact of homelessness and drug addiction on HIV among PLWHA.

Further research is also required to study the impact of Covid-19 on medication adherence in Sacramento County.

## Conclusion

Currently, there is still no cure available for the Human Immunodeficiency Virus (HIV). There are approximately 1.2 million people living with HIV/AIDS, with approximately 36,000 new HIV infections per year in the U.S alone. Despite the development of highly effective medications presently used to treat HIV using cutting edge technologies we have today, rates of medication adherence are still low. This paper has focused on interventions that improve medication adherence among people living with HIV/AIDS in Sacramento County.

Published studies on medication adherence suggest the adoption of multidisciplinary care teams to improve medication adherence due to their ability to supplement patient-doctor interactions for individual people living with HIV/AIDS. Because they are constrained by big workloads, many doctors don't necessarily emphasize HIV medications adherence in their patient interactions. Multidisciplinary care teams collaboratively supplement the doctor-patient interactions, providing the necessary information and support that HIV patients need to adhere to medications. Inadequate patient-doctor interactions create an information gap for patients which translates into low medication adherence rates.

Addressing social determinants of health such as housing, food and medication transportation assistance has been reported to increase medication adherence among PLWHA. This paper argues for addressing the social determinants of health to incentivize HIV/AIDS testing, increase retention in care and help patients achieve viral suppression. This will ultimately improve medication adherence especially among economically and racially marginalized groups.

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## Appendices

### Appendix 1: Literature Review Table (10 articles)

Reference	Title	Description	URL link
1. Erguera X.A., et al., 2019.	<i>WYZ: A pilot study protocol for designing and developing a mobile health application for engagement in HIV care and medication adherence in youth and young adults living with HIV.</i>	Protocol documents the development of WYZ, an mHealth application for engagement in HIV care and ART adherence among YLWH	<a href="https://pubmed.ncbi.nlm.nih.gov/31061063/">https://pubmed.ncbi.nlm.nih.gov/31061063/</a>
2. Dangerfield L.T, et al., 2018.	<i>Exploring the preferences of a culturally congruent, peer-based HIV prevention intervention for black men who have sex with men.</i>	Study highlights barriers to HIV testing, treatment adherence, and the ideal components for an intervention: fear and stigma, and drug use.	<a href="https://pubmed.ncbi.nlm.nih.gov/30185352/">https://pubmed.ncbi.nlm.nih.gov/30185352/</a>
3. Horberg M.A., et al., 2012.	<i>Determination of optimized multidisciplinary care team for maximal antiretroviral therapy adherence.</i>	Study sought to determine the optimized multidisciplinary care team (MDCT) composition for	<a href="https://pubmed.ncbi.nlm.nih.gov/22293551/">https://pubmed.ncbi.nlm.nih.gov/22293551/</a>

		antiretroviral therapy (ART) adherence.	
4. Mimiaga M.J., et al., 2020.	<i>Multilevel barriers to engagement in the HIV care continuum among residents of the state of Rhode Island living with HIV.</i> AIDS and behavior.	Observational study to identify the multilevel factors associated with engagement in the HIV care continuum outcomes.	<a href="https://pubmed.ncbi.nlm.nih.gov/31563986/">https://pubmed.ncbi.nlm.nih.gov/31563986/</a>
5. Tabrisky, A. P., et al., 2021.	Couples-focused intervention to improve engagement in HIV care: protocol for a randomized controlled trial.	Paper describes the protocol for a randomized control trial of a theory that cultivates and leverages the inherent sources of support within primary romantic relationships to improve engagement in HIV care,	<a href="https://doi.org/10.1136/bmjopen-2020-037468">https://doi.org/10.1136/bmjopen-2020-037468</a>
6. Tchakoute, C.T, et al., 2022.	Adherence to contemporary antiretroviral treatment regimens and impact on immunological and virologic outcomes in a US healthcare system.	Study followed PLWH in a California clinic population initiating ART between 2010 and 2017. We estimated longitudinal adherence for each PLWH by calculating the	<a href="https://doi.org/10.1371/journal.pone.0263742">https://doi.org/10.1371/journal.pone.0263742</a>

		medication possession ratio within multiple 6-month intervals using pharmacy refill records.	
7. Wilson, E. C., et al., 2020.	Disparities in the PrEP continuum for trans women compared to MSM in San Francisco, California: results from population-based cross-sectional behavioral surveillance studies.	Study examined pre-exposure prophylaxis (PrEP) disparities between transgender women and men who have sex with men.	<a href="https://doi.org/10.1002/jia2.25539">https://doi.org/10.1002/jia2.25539</a>
8. Weinstein, Z. M., et al., 2016.	<i>Factors associated with adherence to routine screening mammography in HIV-infected women.</i> Journal of women's health (2002). Retrieved June 19, 2022, from	Objective of this study was to identify factors related to adherence to routine screening mammography in a diverse inner-city cohort of HIV-infected women.	<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4876520/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4876520/</a>
9. Glenda N.B., et al., 2016.	<i>Medication adherence among transgender women living with HIV.</i>	Examined demographic and clinical factors related to self-reported medication	<a href="https://pubmed.ncbi.nlm.nih.gov/26908228/">https://pubmed.ncbi.nlm.nih.gov/26908228/</a>

		adherence among transgender women.	
10. Sevelius J.M., et al., 2021.	<i>Uptake, retention, and adherence to pre-exposure prophylaxis (prep) in triumph: A peer-led prep demonstration project for transgender communities in Oakland and Sacramento, California.</i>	Evaluate PrEP uptake, retention, and adherence among TRIUMPH (Trans Research–Informed communities United in Mobilization for the Prevention of HIV) participants and examine site-based differences.	<a href="https://pubmed.ncbi.nlm.nih.gov/34757990/">https://pubmed.ncbi.nlm.nih.gov/34757990/</a>

## Appendix 2: MPH Foundational Competencies

Competency	APEX Objective or Activity
<b>Evidence-based Approaches to Public Health</b>	
1. Apply epidemiological methods to the breadth of settings and situations in public health practice	
2. Select quantitative and qualitative data collection methods appropriate for a given public health context	Create data consistency and completeness in CRM system.
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software as appropriate	Run monthly reports on Total Case Management (Billing) by Case Manager/Client. Food assistance, Childcare assistance, client lists, viral and CD4 counts.
4. Interpret results of data analysis for public health research, policy and practice	Present reports to executive director and management to decision making.
<b>Public Health &amp; Health Care Systems</b>	
5. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings	
6. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels	

<b>Planning &amp; Management to Promote Health</b>	
7. Assess population needs, assets and capacities that affect communities' health	
8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs	
9. Design a population-based policy, program, project or intervention	Create data reporting and governance from the CRM.
10. Explain basic principles and tools of budget and resource management	
11. Select methods to evaluate public health programs	
<b>Policy in Public Health</b>	
12. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence	
13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes	
14. Advocate for political, social and economic policies and programs that will improve health in diverse populations	
15. Evaluate policies for their impact on public health and health equity	
<b>Leadership</b>	

16. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making	
17. Apply negotiation and mediation skills to address organizational or community challenges	
<b>Communication</b>	
18. Select communication strategies for different audiences and sectors	
19. Communicate audience-appropriate public health content, both in writing and through oral presentation	Present reports to executive director and management to decision making.
20. Describe the importance of cultural competence in communicating public health content	
<b>Interprofessional Practice*</b>	
21. Perform effectively on interprofessional teams	Communicate report outcomes to case managers and mental health clinicians to improve performance.
<b>Systems Thinking</b>	
22. Apply systems thinking tools to a public health issue	