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Review Article

HIV Testing Care and Treatment: A Guide for Health Care Providers in Pakistan

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Abstract

Human Immunodeficiency Virus (HIV) is an evolving epidemic and a major public health challenge in Pakistan. Currently, the HIV epidemic is growing not only in key populations such as injection drug users and sex workers, but it is also spreading to Pakistan's general population. Poor infection control practices, including reuse of needles for therapeutic injections, poor screening of blood products, and usage of contaminated equipment at healthcare facilities, remain a significant source of iatrogenic spread of HIV in Pakistan's general population. There are global strategies in place to help countries take control of and curb HIV outbreaks. Pakistan is working towards achieving global standards of HIV control by providing free ART medications to all HIV diagnosed patients registered with its HIV antiretroviral therapy (ART) centers in the country. It is a proven fact that ART is highly effective in achieving a patient's viral load suppression, thus breaking the chain of transmission as well as ensuring a remarkably high quality of life for patients. Yet Pakistan faces social, economic, and religious barriers to controlling its rapidly evolving HIV epidemic due to testing and treatment delays. There is, therefore, a dire need to raise awareness among Pakistan's general population about HIV transmission and to educate physicians on proper HIV testing and management, including detailed history taking, identifying at-risk patients, counseling, and ensuring continuity of care for HIV patients. Physicians also serve as key influencers for the public and can positively influence the general public's attitudes and behaviors, with the goal of reducing HIV stigma to help curb Pakistan's rapidly evolving HIV epidemic.

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Introduction

Human Immunodeficiency Virus (HIV) causes acquired immunodeficiency syndrome (AIDS) and is an emerging public health concern in Pakistan. The prevalence of HIV in Pakistan is less than 0.1%, and the estimated population affected is around 183,705 according to Global AIDS monitoring data of United Nations 2020.[1] Pakistan encountered the first phase of the HIV epidemic, the phase of low prevalence, from 1987 to 2003. Between 2003 and 2019, approximately seven HIV outbreaks have been identified in Pakistan, with more than half occurring between 2016 and 2019.[2] Iatrogenic transmission through reuse of infected needles and syringes as well as contaminated blood products was reported as the main cause of five out of these seven outbreaks.[2] Of the seven reported outbreaks, three occurred in Sindh and four occurred in Punjab. The first major reported epidemic outbreak was in 2003 in the city of Larkana, where 9.7% of persons who inject drugs were found to be infected with HIV. The second reported outbreak was in 2016, also in Larkana, among patients receiving renal dialysis.[3] In 2019, a grade 2 emergency was declared by WHO in the same city, where more than 30,000 individuals were tested with 2.9% resulting positive, comprising 80% children of age less than 15 years.[2] The epidemic transition metrics by the Joint United Nations Programme on HIV/AIDS (UNAIDS) demonstrates a change

in new HIV infections since 2010.[4] Currently, the HIV epidemic is deeply rooted and moving towards the third phase of the epidemic, which is a phase in which transmission of cases to the general population occurs through sexual networks, bridging populations (spouses and partners of patients living with HIV (PLWHIV), iatrogenic infections (reuse of needles, use of contaminated equipment, and use of contaminated blood products in medical and non-medical settings), vertical transmission (mother-to-child during pregnancy, delivery, or breastfeeding), and occupational transmission (to healthcare workers during service provisions to PLWHIV). All these diverse transmission dynamics, which have led to an increase in the number of unidentified cases, in conjunction with on-going stigma, are contributing to the evolving HIV epidemic in Pakistan.[5]

The National AIDS Control Program (NACP) in Pakistan was established in 1987 with the aim of diagnosing cases and providing treatment.[6] It also focuses on community surveillance and control over nationwide transmission through its collaboration with provincial AIDS programs and various UN agencies such as UNAIDS, United Nations International Children's Emergency Fund (UNICEF), and World Health Organization (WHO). The Global Fund is providing HIV diagnostics and medications (antiretroviral therapy- ART) to people living with HIV (PLWHIV) free of cost through government and private partners. Global Fund has provided around US$697 million to Pakistan since 2003 to fight against tuberculosis, HIV, and malaria. As a developing country, Pakistan faces economic and literacy barriers towards conducting an effective campaign for halting the spread of HIV. Other issues that affect HIV transmission and prevention include weak national and provincial coordination, malpractice by unregistered medical providers, poor infection control measures during blood transfusions, improper sanitization of instruments and reuse of syringes, sexual and gender-based violence, erroneous record of cases, stigma, and lack of social support needs.[7]

Elimination of discrimination, reduction of sexually transmitted disease transmission, training of medical staff, conduction of research, and strengthening of institutional frameworks are essential to combat the evolving HIV epidemic. Physicians can play a primary role in the fight against HIV by influencing public attitudes towards safe sex practices and reducing risk behaviors such as needle sharing and using injecting equipment. Clinicians can investigate risk factors and screen patients, facilitating partner notification, effective counseling, appropriate testing, and support for patients throughout the disease process.[8] However, there is limited teaching and training of HIV for physicians in Pakistan. It is therefore imperative to raise awareness and educate medical care providers in Pakistan regarding updated HIV education, screening, testing and treatment. Thus, the aim of this paper is to synthesize the literature regarding evidence-based recommendations for HIV testing, care, and treatment in a country where it is most needed.

Adolescents and adults should be counseled about the potential benefits and risks of disclosure of their HIV status and empowered and supported to determine if, when, how, and to whom to disclose. Pre- marital counseling of couples is mandatory. Most individuals don't disclose their HIV status to their spouses out of fear of breaking a relationship. The same is true when it comes to surgical procedures; the majority don't disclose it because of stigma and discrimination and secondly if they disclose the status, majority of the hospitals, especially private hospitals, refuse to provide surgical services, and if they provide, they take extra charges for taking care of PLWHIV because of the fear that the general public will stop coming to the hospital if they learn that this hospital provides HIV care and their business will be jeopardized. Poor knowledge of disinfection and sterilization among health care providers is yet another big challenge.

Literature Review

1. Screening & Testing

HIV testing is offered to anyone who wants to get tested and to all those who have signs and symptoms related to acute and chronic HIV infection. In addition, it is recommended that high-risk patients undergo screening for HIV. Any patient with potential exposure to HIV, either through sexual or percutaneous routes, also should be assessed for possible infection. Apart from this, patients with high-risk behaviors on pre-exposure prophylaxis should be tested before starting the medication and continue to be tested every 3 months.[9] All pregnant women should be tested during each gestational period with retesting advised during the third trimester for injection drug users and women with multiple sexual partners. For women with unknown and undocumented HIV status, expedited rapid screening is advised during labor, delivery, and the immediate post-partum period.[10]

Early testing for HIV is beneficial as patients can be diagnosed in the asymptomatic period. With early initiation of treatment, the HIV viral load becomes undetectable and chances of sexual transmission to others become negligible.[11] Early diagnosis and treatment initiation has been demonstrated to have clear benefit, both in terms of morbidity and mortality, to patients.[12] Importantly, beyond the individual's own health benefit, early diagnosis and treatment have been clearly associated with a significant public health benefit, as people on treatment with an undetectable serum HIV viral load cannot transmit HIV to others. Several recent studies,

including HPTN 052, PARTNER, PARTNER 2, Opposites Attract, have demonstrated that PLWHIV who are prescribed and adherent to antiretroviral therapy and have a suppressed viral load (generally defined as less than 200 copies/mL), do not transmit HIV infection through condomless vaginal or anal sex to HIV-negative sexual partners. The transmission risk was in fact zero for individuals who were undetectable.[13-16] This concept of "treatment as prevention" has been popularized in the lay press as "U=U" ("undetectable equals untransmittable"). The US CDC has in fact stated that "A person with HIV who takes HIV medicine as prescribed and gets and stays virally suppressed or undetectable can stay healthy and will not transmit HIV to their sex partners."[17]

Couples HIV testing and counseling can identify seroconcordant positive couples who can be linked to treatment and receive treatment adherence support. Services should be offered to married and cohabiting couples, premarital couples, polygamous unions, and any other partnerships.[18] Without timely diagnosis, patients may be tested during late stages of HIV disease with opportunistic infections. This delay in testing increases morbidity, transmission, cost of treatment for the patient, and mortality. The following types of diagnostic HIV tests are available, which are performed on serum, saliva, or urine:

Nucleic Acid Amplification Tests (NAAT): The nucleic acid tests detect HIV viral genetic material including both DNA and RNA. These tests become positive within 10-33 days.[9] Amplification is done through nucleic acid amplification and polymerase chain reaction (PCR). These tests can be qualitative and quantitative; qualitative tests are used for screening HIV-positive blood donors and quantitative tests are used for monitoring the treatment response. Infants born to HIV-positive mothers carry the maternal HIV antibody for around 15, and 18 months. Therefore, this is the primary test used during infancy. Lastly, indeterminate western blots tests in acute infection and immunosuppressed patients can be confirmed with nucleic acid testing.

Antigen/Antibody (Ag/Ab) Tests: These tests detect both the antigen (p24 proteins) and HIV antibody and are positive 18-90 days following exposure.[9] The sensitivity of this test approaches 100% for chronic HIV infections. There are third generation enzyme immunoassays (EIA), which rely on detection of HIV immunoglobulin IgM and IgG and fourth generation enzyme immunoassays, which detect both p24 antigen and HIV antibodies. The latter have shortened the window for positive tests by 4.4-4.8 days as compared to third generation tests.[19] In the case of negative results of a fourth-generation test, HIV infection is ruled out. There are rapid point-of-care tests that provide reactive results within 15-30 minutes. These point-of-care tests are quick, and easy to perform without the use of complex equipment. They can be performed at homes, community centers, and laboratories using saliva, urine, capillary blood, serum, or plasma.[20-22]

Antibody Tests: These tests are utilized for both screening and confirmation of an initial positive Ag/Ab test. Enzyme-Linked Immunoassay (ELISA)-based detection of antibodies are positive after 23-90 days from exposure.[9] Because of the low levels of antibodies during the early infection or seroconversion phase, these tests can result in false-negative cases as well. Hence, they have low sensitivity as compared to antigen /nucleic acid-based tests, especially during early infections.[23] However, these are highly sensitive in chronic HIV infections, and their low specificity, they result in false positives.

1.1 Testing in Pakistan

In Pakistan, NACP formulates and ensures the testing strategies for HIV as a gateway to HIV prevention and care. The two main testing strategies are: voluntary confidential counseling and testing also known as client-initiated testing and counseling, and Provider-initiated HIV Testing and Counseling (PITC). Treatment protocols are recommended to adhere to the five C's: consent, confidentiality, counseling, correct test results, and connections to care, treatment and prevention services.[24]

WHO recommends that all HIV testing algorithms achieve at least 99% positive predictive value and use a combination of tests with ≥99% sensitivity and ≥98% specificity. The first test in an HIV testing strategy and algorithm should have the highest sensitivity, followed by a second and third test of the highest specificity.

ART centers in Pakistan use a three-test strategy as recommended by the World Health Organization (WHO). All people presenting for HIV testing services have three consecutive reactive test results to receive an HIV-positive diagnosis. These tests are Alere HIV Combo (4th Generation rapid test), Trinity biotech Unigold (3rd Generation rapid test) and SD Bioline (3rd Generation rapid test).[25]

The algorithm starts with the first rapid test, which if returns positive, is followed with the second test; and if the second test result is positive, then the third rapid test is conducted. The patient is considered HIV positive if the third test is positive (Figure 1). However, if the second rapid test is negative, then test 1 and 2 are repeated after 14 days. Following 14 days, if the first rapid is positive and second is negative again, then the patient is referred to tertiary care for confirmatory testing by ELISA or PCR. If the second test is positive and the third rapid is negative, then all three must be repeated after 14 days. All three tests need to be positive to confirm HIV infection.[26]

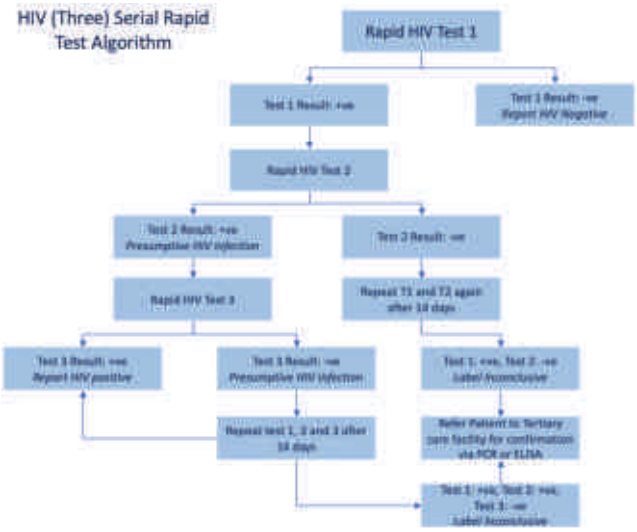


Figure 1: *HIV (Three) Serial Rapid Test Algorithm*[25]

There are around 50 centers in public hospitals throughout the country where HIV diagnostic testing is done. Apart from that, there are community-based organizations in 8 cities that do community HIV testing: 5 for transgender communities, 4 for men who have sex with men and male sex workers, and 4 for female sex workers.

2. HIV CARE CASCADE

The HIV care continuum, also called the treatment cascade, is a public health model that frames stages in which every individual with HIV goes through, from diagnosis to viral suppression. The steps include diagnosis of HIV infection, linkage to HIV medical care, initiation of treatment, and retention in care and treatment. It is important at both the patient-level and community-level to monitor disease outcomes.

In 2014, UNAIDS established a new strategy to bring the HIV epidemic under control. This international campaign was based on the HIV care continuum, which translates this cascade framework into three goals and sets new global targets for HIV response.[27,28] It is named as the 90-90-90 strategy, and states that 90% of people living with HIV should be diagnosed and aware of their status, 90% of those diagnosed should receive antiretroviral therapy, and that 90% of those on treatment should have undetectable viral load by 2020.[29] The first goal has become easier by extending worldwide availability of rapid tests. The second and third goals are harder to achieve as they involve starting and maintaining appropriate HIV Treatment. The third goal requires access to accredited laboratories for ensuring high-quality viral load testing.[30] These goals also involve increasing each country's national HIV response funding to help patients with high ART drug costs. Ensuring global access to generic drug alternatives can also ensure the continuity of treatment, particularly in middle and low-income countries.30,31 UNAIDS recently reset the goals for 2030 and changed them to 95-95-95 instead of 90-90-90.

2.1 HIV Care cascade in Pakistan

In Pakistan, HIV stigmatization and discrimination imparts a significant challenge to accessibility to care. According to the National AIDS Control Program (NACP), there were approximately 46,912 registered cases of HIV by June 2021, and out of these only 26,093 individuals are currently receiving ART.6 This number constitutes 55.62% of total cases, which is still a long way from the 90% goal. Work towards the first goal of the UNAIDS 90-90-90 marker is being reached through targeted interventions such as PITC, community-based testing, and collaboration with private trust organizations. HIV testing coverage among infants and children needs to be expanded as well. In case of HIV positive cases, linkage to care, treatment, and adherence must follow. For HIV negative at-risk individuals, linkage to prevention is required. In addition, STI clinics and TB clinics should be equipped with HIV testing services and linkage to care facilities. Retesting is essential for key populations and for people with ongoing risk of exposure. Like many countries, the second and third goals of the UNAIDS 95-95-95 program provide a challenge for Pakistan. However, NACP is working to overcome these challenges for all HIV patients by focusing on treatment adherence and maintaining viral suppression. These steps include provision of ART, monitoring testing, prevention techniques, STI, TB, Hepatitis B and C, cervical and anal cancer screening, and testing for families and partners.[32,33] Decentralization of ART distribution with community-based provision and continuous reinforcement techniques by health-promotion workers can significantly contribute to achieving the 95-95-95 goals in Pakistan.[27]

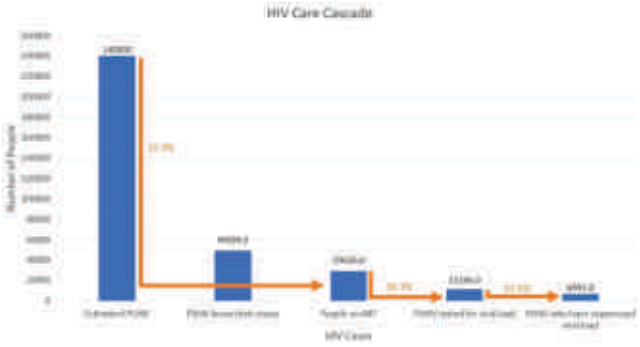


Figure 2: *HIV Care Cascade, Pakistan. Data taken from the National AIDS Control Program, Pakistan website*[6]

3. TREATMENT

After a positive HIV diagnosis, early initiation of antiretroviral therapy treatment is recommended. Antiretroviral therapy is offered to everyone with HIV, regardless of immune status and symptomatology. This is important

as a delay in treatment during early HIV infection can result in rapid disease progression with increased mortality. A study performed in a group of African women demonstrated that the higher viral load and more-severe acute HIV-1 illness led to rapid progression of disease to death.[34] Moreover, early ART treatment increases the chances of immune reconstitution to normal or near-normal CD4 levels in chronic infections. A prospective observational study done by Le et al. revealed that initiation of ART during the first 4 months of HIV-1 infection was associated with an enhanced and fast recovery of CD4+ counts and the rate of recovery declined progressively afterwards[35]. Other studies have also shown that the early ART also correlated with lower HIV DNA and RNA cellular reservoir sizes[36].

Initially, treatment begins with the standard approved therapy and individuals are tested for drug resistance. Later, the choice of drugs is altered in accordance with results of the baseline resistance testing. Some of the HIV-drug classes approved by US Food and Drug administration are as follows:

Reverse Transcriptase Inhibitors: This class of drugs binds and inhibits the activity of a viral DNA polymerase enzyme, reverse transcriptase, that is required for synthesis of DNA from viral RNA and halts the replication process. These are divided into two subclasses: Nucleoside reverse transcriptase inhibitors (NRTIs) and non-nucleoside reverse transcriptase inhibitors (NNRTIs). Available NRTIs are Lamivudine, Stavudine, Abacavir, Zidovudine, Didanosine, Emtricitabine, and Tenofovir. Available NNRTIs include Nevirapine, Efavirenz, Delavirdine, and Etavirine.

Protease inhibitors: This group of drugs selectively binds and effectively blocks the viral protease enzyme, HIV-1 protease, which inhibits the proteolytic cleavage and assembly of protein precursors required for maturation of HIV virions. The result is immature and non-infectious viral particles. Examples of these drugs are Lopinavir, Ritonavir, Saquinavir, Indinavir, Amprenavir, Tipranavir.

Integrase Strand Transfer Inhibitors: This class of drugs binds and blocks the action of enzyme, integrase, which is required for integration of viral DNA into the genome of host CD4 cell. Again, the process of replication has ceased. Examples of these drugs are Raltegravir, Dolutegravir, Bictegravir, Cabotegravir, and Elvitegravir.

In adults, the recommendation is to begin treatment with two NRTIs and one NNRT. The United States Department of Health and Human Services has recommendations on starting treatment with one of following regimens.[37] Dolutegravir plus Tenofovir plus Emtricitabine or Lamivudine; Bictegravir plus Tenofovir Alafenamide plus Emtricitabine; and Ritonavir-boosted Darunavir plus Tenofovir plus Emtricitabine or Lamivudine. In pregnant and breastfeeding females, Dolutegravir-based regimen is recommended.[38] The choice of drug therapy is also influenced by viral load, initial CD4 count, drug resistance testing, drug cost, and patient preference.

3.1 HIV Treatment in Pakistan

In Pakistan, after confirmation of HIV, registration of the patient is performed, a unique identification number is assigned, and an appointment card is handed over. At the first visit, the physician assesses the clinical status of the patient, including symptomatology and opportunistic infections. Treatment is initiated and prophylaxis for opportunistic infections according to CD4 counts is started. Additional laboratory testing is performed, as needed and chest x-ray is performed to rule out active tuberculosis before starting ARVs. Patients are referred to a counselor who is responsible for their psychosocial support. In the second visit, the patient is encouraged to choose 'treatment assistance' from the family or friends.[3] Adherence to treatment is reinforced, and resistance mechanisms are explained. All patients are provided with contact numbers to call for additional information or if they require any kind of support.[39] Provision of service varies depending on level of expertise, type of center providing HIV care (primary vs tertiary care) and onsite availability of laboratory tests. Patients are also provided free indoor services in tertiary care hospitals e.g., Pakistan Institute of medical Sciences owns a 12 bedded Infectious Diseases ward with ID consultant and dedicated ID fellows to take care of the patients. TB and HIV services are provided under one roof including testing, treating and counseling patients with both diseases free of cost. The only challenge is diagnostic facilities for opportunistic infections for which patients must spend out of their own pocket.

The following regimen is currently being used in Pakistan as the first line treatment: Tenofovir, Lamivudine and Dolutegravir; with alternative recommendation as Tenofovir disoproxil fumarate + Lamivudine + Efavirenz.[40] ART is only available at government-run ART centers in Pakistan. There are 50 centers in total, with 5 in Khyber Pakhtunkhwa, 2 in Balochistan, 1 in federal-administered areas, 26 in Punjab and approximately 16 in Sindh. In these centers, a central management information system is maintained which holds data on all the HIV patients. Lab testing during treatment, (CD4 and viral load testing) are provided free of cost, which is ensured through The Global Fund. The major problem is linking patients to care and diagnostic facilities which often results in many patients being lost to follow up. Another important issue is the lack of physicians with relevant training in these centers. A "Differentiated Service Delivery Model" is now implemented in

hospitals throughout the country, in which initial testing and treatment is done by ART centers and subsequent follow up and medications will be provided by local basic health units.[41] This will help maintain continuity of care in Pakistan.

3.2 Pre-exposure prophylaxis (PrEP)

The drug therapy given to prevent transmission of HIV is referred to as pre-exposure prophylaxis. Individuals should be tested before starting PrEP and testing should be repeated every 3 months.[42] The regimen commonly employed and recommended by CDC is Emtricitabine + Tenofovir Disoproxil Fumarate or Emtricitabine + Tenofovir Alafenamide.[43] Studies have demonstrated that consistent use of PrEP reduces the risk of HIV from sexual route by 90% and injection drug use by 74%.[44] In Pakistan, PrEP medications are provided as per national policy, which aligns with the WHO guidelines of using Tenofovir and Lamivudine.[45,40]

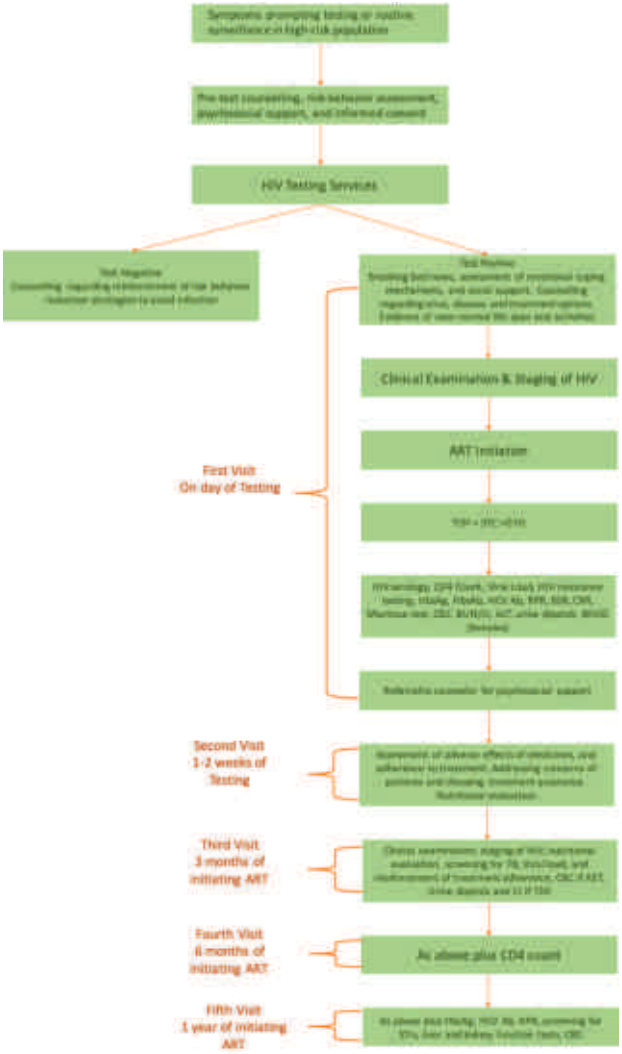
3.3 Post-exposure prophylaxis (PEP)

The use of ART given to the individual after a single high-risk event such as unprotected sex with an unknown partner, or needlestick injury to prevent HIV seroconversion, is called PEP.[46] It should be started as early as possible after the exposure, typically within 72 hours. The prophylaxis is a three-drug regimen and taken for 28 days. This is followed by a fourth-generation test after 6 weeks and 4 months. The regimen commonly used are Tenofovir disoproxil fumarate/emtricitabine plus raltegravir, and Tenofovir disoproxil fumarate/emtricitabine plus dolutegravir in females of childbearing age or those who are pregnant.[47] Lamivudine may replace emtricitabine in both regimens. A study in 2016 revealed that PEP was 96.8% effective in preventing seroconversion.[48] In Pakistan, the first recommendation is to wash the exposed site rigorously with water and soap-based solution or flush the exposed mucus membranes with sterile saline solution. The occupational exposure incident report proforma is then filled and submitted to the laboratory supervisor who, in turn, refers the patient for PEP in the treatment center. The regimen recommended by the designated Medical Officer is followed. If HIV status is unknown, then testing for HIV, hep B and hep C are performed, while maintaining the confidentiality of the source person. Efavirenz- or lopinavir/ritonavir-based regimen is generally recommended.[49] Tenofovir + Lamivudine + Dolutegravir is the preferred regimen recommended by WHO.[40]

4. Treatment Monitoring

After the initiation of ART, all patients should be followed within one to two weeks to discuss treatment adherence, medication persistence, adverse effects, prevention of transmission, and addressing any other concerns. The goal of treatment is adequate viral load suppression and maintaining CD4 within normal limits.

Figure 3*: *Comprehensive Management of HIV patients according to WHO recommendation*



** Antiretroviral treatment (ART), Tenofovir disoproxil fumarate (TDF), Lamivudine (3TC), Dolutegravir (DTG), Hepatitis B surface antigen (HbsAg), Hepatitis B surface antibody (HbsAb), Hepatitis C Antibody (HCV), Rapid Plasma Reagin (RPR), Blood sugar random (BSR), Chest X-Ray (CXR), Complete Blood Count (CBC), Blood Urea Nitrogen/ Creatinine (BUN/Cr), ALT (Alkaline Phosphatase), Beta Human Chorionic Gonadotropin (BHCG), Zidovudine (AZT), Sexually transmitted Infections (STIs).*

Viral load: HIV viral loads are measured in each patient at baseline, after 2-8 weeks of initiation of therapy, and then every 4-8 weeks until they become undetectable, and finally every 3-6 months.[50] The goal is for HIV viral loads to become undetectable by 8-24 weeks. Virological failure is defined as an inability to reach the VL of <200 copies within 24 weeks of initiation of ART or a sustained

recurrence of viremia to >200 copies in two consecutive measurements. In the case of virological failure, causes such as drug compliance, resistance, subtherapeutic levels, drug interactions and poor absorption should be considered and worked on.

CD4 count: CD4 cell counts, representing the immune response, are measured in each patient at baseline, after 3 months of initiation of therapy, and subsequently after every 3-6 months.[50] The goal is an increase in CD4 count of 50 cells/mm^3 at 4-8 weeks, and then increments of 50-100 cells/mm^3 per year. The rate of increase in CD4 cells is a slow process and slow increase does not represent treatment failure. If the CD4 count comes within normal limits without viral suppression, factors such as extensive drug resistance should be considered.

4.1 Treatment monitoring in Pakistan

In Pakistan, bi-monthly follow up is recommended for the first month, then monthly for the first year and every 2-3 months afterwards.40 Viral load is conducted after 3 months of initiation of ART, with the second one performed after another 3 months. Once viral load is suppressed, then testing every 6 months is recommended. Monitoring with HIV viral loads is the preferred monitoring strategy employed for diagnosing and confirming ART failure. CD4 counts are checked with the VL initially; continued monitoring can be paused for those who are stable on ART for at least 12 months and two consecutive undetectable viral load measures have been taken 6 months apart.[40]

Conclusion

In Pakistan, there is a lack of surveillance for HIV in the general population. The true burden of the disease therefore remains unknown. In addition, training and competence of physician and factors like cultural, religious, and social norms, a reluctance in taking detailed sexual and personal history results in delayed testing for HIV and thus, deferred treatment. This can have a dire consequence of rapid transmission of HIV infection across communities. This is one of the primary causes of the evolving HIV epidemic faced by Pakistan today along with the lack of control over unsafe injection practices in both clinics and personally. To decelerate the progression of the epidemic, a 95-95-95 strategy needs to be employed. This would require beginning virus surveillance in pregnant patients, blood donors, thalassemic patients, hepatitis C and tuberculosis patients. This also requires raising awareness among high-risk population groups on HIV disease and testing. There is also a need to focus our attention to reduce the use of reused needles in all sectors. Reuse of needles is an issue that needs to be studied more carefully. There is a need to educate all physicians regarding testing the right individuals with the correct tests and referring them to appropriate centers for treatment and follow-up. Moreover, physicians are key influencers for the public, who can counsel patients, influence behaviors, and guide patients towards continuity of care throughout the whole disease process. Also, all healthcare providers (including hospital administration and paramedical staff) need to be trained on disinfection and sterilization procedures for surgical equipment. Only with clinician education, hospital administration, and paramedical staff education, public awareness, implementation of different prevention strategies, surveillance, and expansion of testing and treatment can Pakistan curb the spread of HIV.

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