AUCTORES
Globalize your Research

International Journal of Clinical Case Reports and Reviews
Dirgha.P. Gujarathi *

Open Access

Review Article

HIV Prophylaxis Post -Exposure: An Extensive Analysis

Dirgha.P. Gujarathi *, Jayesh Trivedi

***Corresponding Author:** Dirgha.P. Gujarathi,

Received Date: May 15, 2024 | **Accepted Date:** May 24, 2024 | **Published Date:** June 03, 2024

Citation: Dirgha.P. Gujarathi, Jayesh Trivedi, (2024), HIV Prophylaxis Post -Exposure: An Extensive Analysis, *International Journal of Clinical Case Reports and Reviews*, 17(4); **DOI:10.31579/2690-4861/445**

Abstract:

Recent small trials involved limited number of patients shown an increased risk of Venous thromboembolism in HIV patients, pulmonary thromboembolism being one of them. Patients with HIV infected and thromboembolism may have a typical clinical presentation mimicking common cold such as fever, cough and dyspnea. We describe case report of patients with symptom mimicking pneumonia who presented with acute pulmonary embolism and treated then subsequently diagnosed as having HIV infection

Keywords: hiv; hiv prophylaxis; epidemiology

Introduction

As one of the most important interventions in the toolbox of HIV preventive techniques, post-exposure prophylaxis (PEP) provides a window of opportunity to reduce the risk of HIV transmission after possible exposure. Though tremendous progress has been made in the treatment and prevention of HIV, unintentional viral exposure remains a major global health concern, especially for healthcare personnel, victims of sexual assault, and those participating in high-risk activities. PEP is an essential component of the all-encompassing strategy for HIV prevention as it offers those who are at risk of HIV acquisition after exposure a time-limited course of antiretroviral medication. In order to fully explore the terrain of PEP, this thorough review will look at its epidemiology, mechanisms of transmission, exposure risk factors, suggested regimens, effectiveness, side effects, and unique demographic concerns.

In addition, it looks at new developments, obstacles, and directions for PEP implementation and research, providing insight into how HIV prevention tactics are changing for a variety of people and environments. This research aims to provide comprehensive insights and direction for efforts to optimize HIV prophylaxis after exposure and eventually lower the worldwide HIV/AIDS burden by providing a detailed examination of the many facets of PEP.

Epidemiology and Rationale:

Notwithstanding improvements in preventive and treatment options, HIV infection remains a serious worldwide health concern. Data from 2022 and 2023 show that the HIV epidemic is still active, with an estimated 37.7 million individuals living with the virus globally. Around two thirds of all HIV-positive individuals live in Sub-Saharan Africa, which continues to be the most severely afflicted region. However, the incidence of HIV varies by area; rising rates of new infections are seen in Eastern Europe, Central Asia, and some communities in Asia. The various ways that HIV may spread are highlighted by the epidemiology of the virus, such as through sexual contact, drug injection, vertical transmission (from mother to child), and occupational exposures (1). Healthcare personnel are more likely to come into contact with HIV at work through needlestick injuries, spills, and other mishaps involving potentially infectious bodily fluids. This is especially the case for individuals who operate in environments where HIV incidence is high. The capacity of post-exposure prophylaxis (PEP) to reduce the risk of HIV transmission after possible exposure to the virus serves as justification for its use. By starting antiretroviral medication (ART) as soon as possible after exposure, PEP functions as a crucial intervention to avoid seroconversion. Since HIV replication may quickly establish infection in the first few days after exposure, the success of PEP depends on the idea of early intervention. For PEP to be as effective as possible, it must be started on time—ideally, within hours after the exposure and no later than 72 hours later (2,3). PEP is advised in a number of situations, including sexual encounters, occupational exposures (e.g., needle sharing among injecting drug users), and non-occupational exposures (e.g., healthcare professionals). The type of exposure, the risk assessment of the source person (if known), the possibility of HIV transmission, the local prevalence of HIV, and medication resistance trends all play a role in determining whether to start PEP. Additionally, by preventing new infections, PEP is essential in lowering the burden of HIV-related illness and death. It supports more general public health objectives of lowering HIV transmission rates and eventually putting an end to the HIV epidemic in addition to giving at-risk persons a sense of empowerment and control over their health. But issues like stigma, lack of understanding, obstacles to access, and the expense of medications keep getting in the way of PEP programs being implemented as effectively as possible around the world (4,5).

Timing of Initiation and Regimen Selection:

After a possible HIV exposure, the timing of commencement and the choice of suitable regimens are important factors in determining how successful post-exposure prophylaxis (PEP) is. According to current standards, PEP should be started as soon as practicable after exposure, preferably within hours and no later than 72 hours. This short window illustrates how PEP is time-sensitive since, in the initial days after exposure, HIV replication can quickly cause infection. Beyond this point, starting PEP takes a lot longer than it should, which makes it even more important to act quickly to diagnose and treat suspected exposure situations. A number of criteria need to be carefully taken into account while choosing a PEP regimen, including as the kind of exposure, the source person's risk assessment (if known), the area HIV prevalence, and medication resistance trends. Combining two nucleoside reverse transcriptase inhibitors (NRTIs) with a third agent from a different class, such as a protease inhibitor, integrase strand transfer inhibitor, or non-nucleoside reverse transcriptase inhibitor, is a common combination of antiretroviral drugs found in commonly recommended regimens (13). Tolerability, medication interactions, and resistance profiles are a few examples of the characteristics that may influence the choice of certain drugs within each class. Guidelines frequently suggest a conventional PEP regimen for occupational exposures among healthcare professionals, which consists of two NRTIs plus a third agent. The choice of third agent is impacted by several factors, including the risk of transmission and the HIV status of the source individual. PEP regimens that involve the administration of antiretroviral medications both before and after planned sexual activity may be deemed on-demand or event-driven in situations of sexual exposure, when the time of exposure may be more accurately defined. More straightforward and bearable regimens have also been developed as a result of advances in antiretroviral therapy, which may increase adherence and lower the chance of side effects. But maintaining the best possible efficacy of PEP still depends critically on customized risk assessment and regimen selection (9).

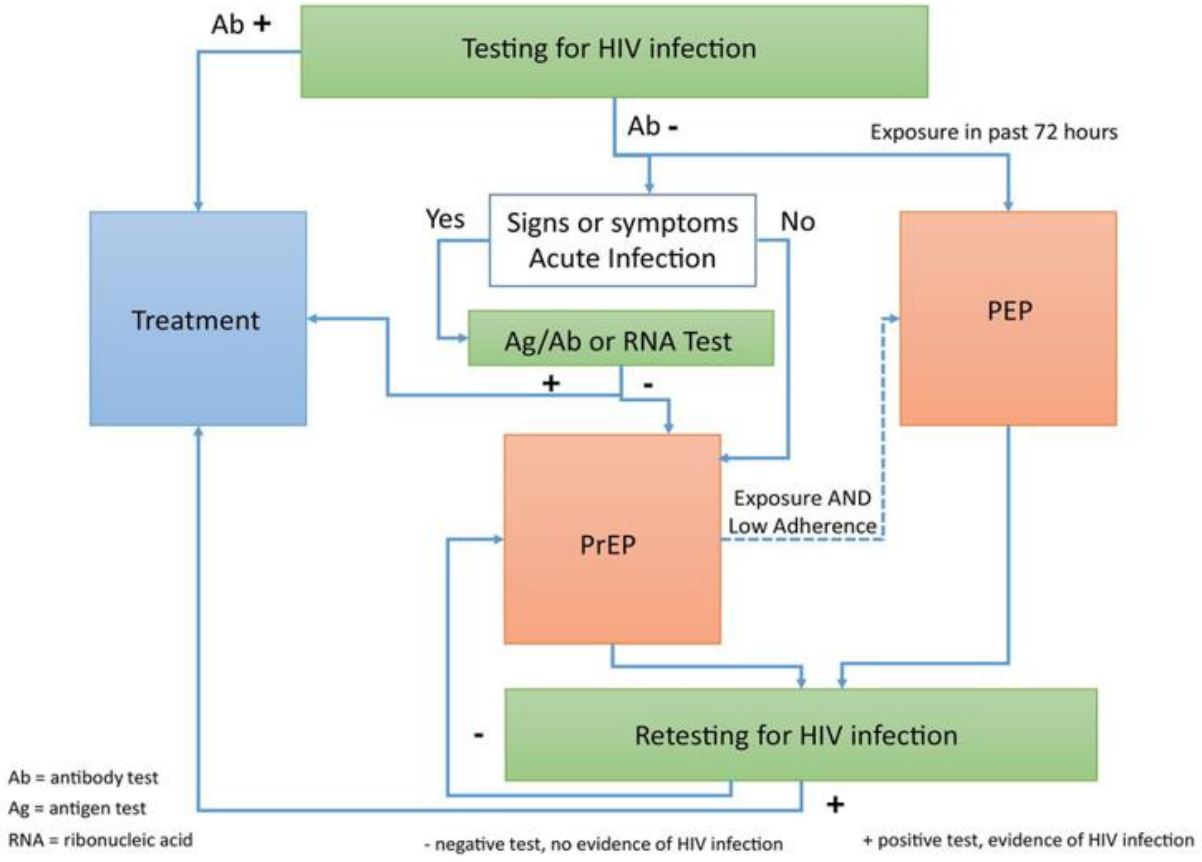

Figure 1: A combined treatment transition protocol, pre-exposure prophylaxis (PrEP), and post-exposure prophylaxis (PEP).

When someone reports having come into contact with fluids that are suspected of containing HIV within the last 72 hours, PEP should be initiated with a three-drug regimen while they wait for the results of their HIV test. Emtricitabine/tenofovir disoproxil fumarate (FTC/TDF) is the recommended starting dose for PrEP in individuals who have been exposed to HIV repeatedly, have tested negative for HIV antibodies, and do not exhibit any symptoms or indicators of acute HIV infection. It is best to have a negative test result for HIV nucleic acids or antigen, particularly if there are acute viral syndrome symptoms or indicators. Antiretroviral medication should be started right once if an HIV test is positive. Specimens should also be sent for drug resistance and HIV confirmation testing as soon as feasible (10).

Duration of Treatment and Monitoring:

When it comes to maximizing results after possible HIV infection, the length of post-exposure prophylaxis (PEP) medication and the monitoring period that follows are crucial factors to take into account. PEP should be administered for 28 to 30 days; however local regulations and the kind of exposure may need a different period. Based on the window of time after exposure during which HIV infection can be successfully avoided, this

length takes into consideration the kinetics of viral replication and the possibility of seroconversion. Antiretroviral therapy (ART) needs time to inhibit viral replication and prevent HIV infection, which is why a suggested period of PEP treatment is necessary. It is crucial to finish the whole course of therapy to optimize effectiveness, since studies have indicated that shorter PEP durations may be linked to higher rates of seroconversion (10,11). In order to evaluate treatment adherence, identify side effects, and keep an eye out for seroconversion, monitoring is necessary both during and after PEP treatment. In order to assess patient adherence to the recommended regimen, resolve any issues or obstacles to adherence, and keep an eye out for any potential side effects of antiretroviral medication, healthcare practitioners usually do routine follow-up visits. In order to rule out seroconversion, serial HIV testing is also advised at baseline, 4-6 weeks after exposure, and 3 and 6 months after exposure. In order to guarantee early identification of seroconversion and timely beginning of HIV treatment if infection occurs, the monitoring period continues after PEP medication is finished. Even with PEP, breakthrough infections can still happen, which emphasizes the need for continuing monitoring and assistance for those who are at risk. During the monitoring phase, there may be obstacles to overcome, such as barriers to healthcare services, societal stigma around HIV testing, and worries about possible seroconversion. To address these issues, a comprehensive strategy that encourages patient participation in treatment and adherence to monitoring procedures must be implemented. This strategy should include patient education, counselling, and support services (12).

Adverse Effects and Adherence:

Even though post-exposure prophylaxis (PEP) for HIV is usually well tolerated, there are still important factors to take into account in order to maximize its efficacy, including the possibility of side effects and adherence issues. Along with tiredness, headaches, and rashes, PEP regimen side effects might include gastrointestinal issues including nausea, diarrhoea, and abdominal pain. The effectiveness of PEP may be jeopardized by these adverse effects, even though they are frequently minor and temporary. They may also lead to treatment termination or non-adherence. Maintaining compliance with the recommended PEP regimen is essential to optimizing its efficacy in halting HIV transmission after exposure (12,13). Complexity of the prescription, the number of pills taken, side effects, logistical difficulties, stigma, and psychological concerns are some of the elements that may affect adherence. Sustaining high levels of adherence over the full course of PEP treatment is necessary to guarantee sufficient medication concentrations and efficiently inhibit viral multiplication. A multimodal strategy that incorporates extensive patient education, counselling, and support services is needed to address adherence issues. In determining if a patient is ready for PEP, talking about possible side effects, and offering helpful coping mechanisms, healthcare professionals are essential. Furthermore, encouraging candid dialogue and clearing up any misunderstandings or worries regarding PEP can boost patients' self-assurance and drive to follow the recommended course of action. Incorporating adherence support treatments, such as pill organizers, peer support networks, and reminder systems, can also assist patients in overcoming obstacles to adherence and encourage treatment persistence. Throughout PEP therapy, routine follow-up visits let medical professionals to keep an eye on patient adherence, evaluate tolerance to the regimen, and quickly address any new problems that may arise. Healthcare practitioners may need to think about other PEP regimens or offer more support services to enhance adherence in situations when adherence issues are severe or persistent. Optimizing results and improving patient participation in treatment can be achieved by customizing therapies to each patient's requirements and preferences (13).

Choosing and Transitioning among Antiretroviral Strategies:

Starting Post-Exposure Prophylaxis vs. Pre-Exposure Prophylaxis at the Right Time:

After a mucosal exposure to fluids that are likely to be HIV-positive, postexposure prophylaxis should be initiated as soon as possible and should ideally last for 72 hours. Different regimens are advised for different purposes (13,14). Regarding PEP vs.PrEP, daily oral FTC/TDF is advised for PrEP, whereas an integrase inhibitor and FTC/TDF combination is advised for PEP in the United States. One benefit of using the suggested three-drug regimens is that they provide complete protection against existing HIV infection, which can be challenging to rule out in the interim period between HIV exposure and seroconversion. It can be difficult to rule out active infection if you have been exposed to potentially contaminated fluids more than once recently. In this case, HIV infection may already be present during the RNA-positive and Ab-negative window period or the eclipse phase, when RNA and Ab are both negative. Due to anxiety, alcoholism, other substance abuse, or repeated exposures, it might also be challenging to determine the date of the most recent injection or sexual experience based only on past experiences. Thorough evaluations are made more challenging by the pressing conditions following a recent exposure. Therefore, it is advised to begin a 3-drug PEP regimen following a substantial exposure during the previous 72 hours prior to the availability of conclusive HIV status test results (14).

A three-drug regimen can also be initiated in individuals whose possible exposures happened more than 72 hours before to presentation, particularly if they have a history of repeated exposures and an acute viral illness at presentation, which calls for immediate attention.

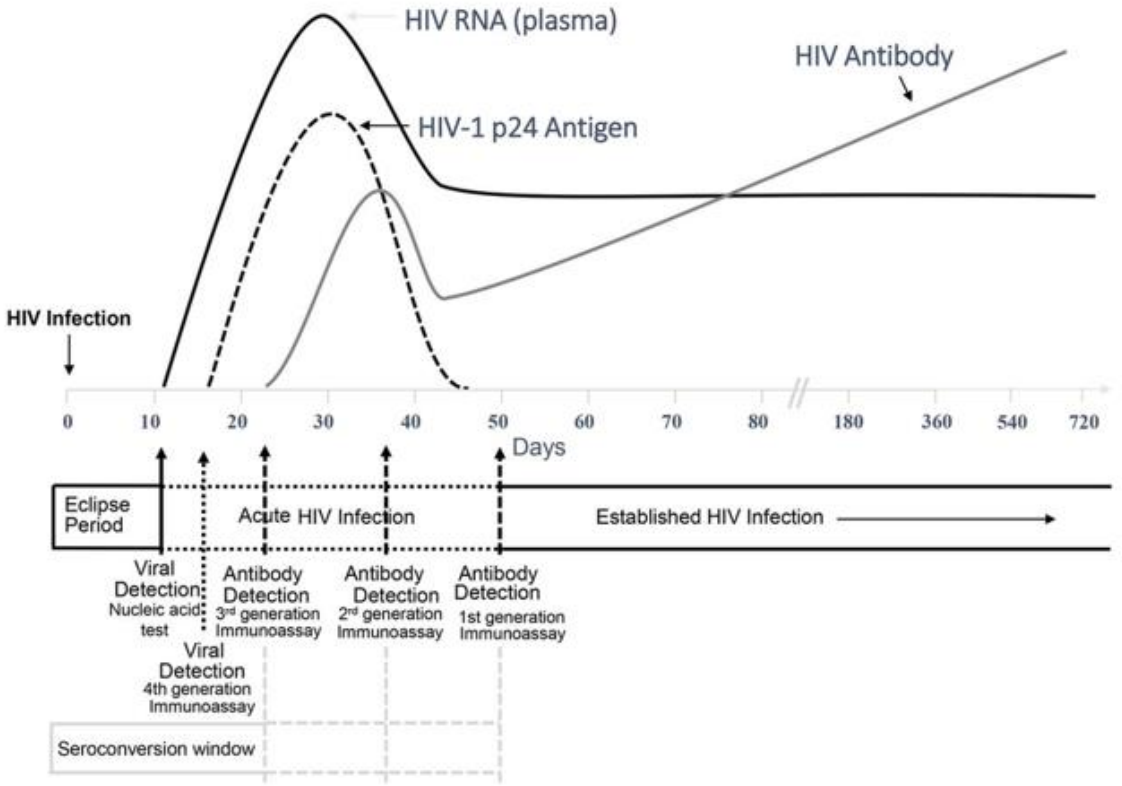

Figure- 2: Sequence of appearance of laboratory markers of human immunodeficiency virus (HIV) infection. The figure is from the updated centres for Disease Control and Prevention (CDC) guidelines for HIV testing and was adapted from prior publications.

Challenges and Future Directions in HIV Prophylaxis Following Exposure:

Although post-exposure prophylaxis (PEP) is successful in lowering the risk of HIV transmission after possible exposure, there are still a number of obstacles to its adoption and use. The lack of knowledge about PEP services' availability and significance among patients and healthcare professionals is a major obstacle. Lack of understanding of PEP eligibility requirements, protocols, and the time-sensitive nature of PEP commencement might cause patients to put off seeking care and lose out on intervention chances. PEP uptake is nevertheless hampered by widespread HIV stigma and discrimination, especially in areas where HIV-related stigma is strong. People may be reluctant to disclose possible exposures or use PEP services because of fear of discrimination, social exclusion, or judgment, which exacerbates gaps in care availability. PEP adoption is further complicated by access hurdles, which might include regional restrictions, financial limits, and a lack of healthcare infrastructure. These barriers are especially problematic in environments with minimal resources. Those without sufficient health coverage or financial means may face insurmountable obstacles due to the expense of antiretroviral medications, laboratory testing, and follow-up treatment. Maximizing efficacy and lowering the risk of seroconversion need strict adherence to PEP regimens (15). However, obstacles including the weight of the pills, side effects from antiretroviral medications, and logistical difficulties might make adherence difficult. Subpar adherence to PEP may also result from inadequate therapy, a lack of support resources, and conflicting priorities in an individual's life. In order to effectively address these issues, a multimodal strategy that includes education, stigma reduction, awareness-raising, and increased access to PEP treatments is needed. To improve PEP adoption and adherence, health systems should be strengthened, PEP services should be integrated into current HIV prevention and care programs, and access to reasonably priced antiretroviral medications should be increased. Future directions in PEP research and implementation aim to overcome existing challenges and improve the effectiveness and acceptability of PEP strategies. This includes exploring novel drug formulations, such as long-acting injectable antiretrovirals, alternative dosing strategies, and simplified regimens to enhance adherence and reduce pill burden. New methods that have the potential to increase access to PEP treatments and remove obstacles to care include telemedicine, mobile health interventions, and community-based outreach initiatives (16).

Transitioning from post-exposure prophylaxis to Pre-exposure prophylaxis:

Unless the viral exposure was described as an isolated incident, an urgent switch to PrEP should be taken into consideration after finishing a PEP course. The CDC has released details on certain PrEP indications and the International AIDS Society-USA. The indications include using condoms inconsistently or not at all outside of a mutually monogamous relationship with a recently tested HIV-negative individual; using PEP more than twice in the previous year; sharing needles; having an HIV-positive sexual partner; recently contracting an STD; or being a woman, including a transgender woman, who has a male partner who engages in sexual activity with men. Since there's no proof that using antiretrovirals as a preventative slows down seroconversion. Because PEP is very successful when taken as directed; there is no need to wait a certain amount of time between finishing PEP and starting PrEP in order to assess HIV infection status. These voids provide room for HIV infections, interfere with regular adherence routines, and present a chance for patients to stop receiving therapy. HIV infections that are present but go undiagnosed at

the beginning of PEP are uncommon, and are often found through HIV testing conducted four weeks into the program (16,17).

It is optimal to employ a test that detects both IgM and IgG Abs (i.e., third- or fourth-generation tests) when testing for HIV infection after 4 weeks of treatment with prophylaxis (Figure 2). These tests are predicted to become positive after 4 weeks of infection. When moving from PEP to PrEP and after three months of PrEP, second-generation HIVAb testing should be place if such tests are utilized. Prophylactic antiretroviral therapy may inhibit human immunodeficiency virus RNA testing, while such was not recorded in studies where seroconversion happened at low or undetectable drug doses (17).

Conclusion:

To sum up, the thorough examination of HIV prophylaxis after exposure highlights the vital function of post-exposure prophylaxis (PEP) in stopping the spread of HIV and lessening the impact of the epidemic. It is clear from a thorough analysis of the epidemiology, justification, regimen selection and scheduling, length of therapy and monitoring, side effects, adherence, difficulties, and future directions that PEP is an essential intervention in HIV prevention efforts. Even with the tremendous breakthroughs in antiretroviral medicine and PEP implementation, obstacles still exist, including as stigma, cost concerns, adherence problems, and impediments to access. Improving awareness, increasing access to PEP treatments, reducing stigma, and providing support for adherence and retention in care are all necessary components of a multimodal strategy to address these issues.

Future paths in HIV prophylaxis after exposure appear bright, with ongoing studies emphasizing new drug formulations, different ways to dose, formulations that function over time, and regimens that are easier to follow and tolerate. Advances in digital health technology, telemedicine, and point-of-care diagnostics may also make it easier for people in resource-constrained situations to get PEP treatments and monitoring. In the end, putting an end to the HIV pandemic will require persistent dedication, cross-sector cooperation, and creativity. Stakeholders can work toward realizing the vision of an AIDS-free generation in which every person has access to efficient prevention, care, and support services, regardless of risk or background, by addressing the obstacles and seizing future opportunities in HIV prophylaxis.

Conflict of Interest:

There is no conflict of interest between the authors.

References:

1. Centres for Disease Control and Prevention (CDC). (2021). Updated Guidelines for Antiretroviral Postexposure Prophylaxis After Sexual, Injection Drug Use, or Other Nonoccupational Exposure to HIV—United States, 2020.
2. World Health Organization (WHO). (2020). Consolidated guidelines on HIV prevention, testing, treatment, service delivery, and monitoring: Recommendations for a public health approach.
3. Smith, D. K., Grohskopf, L. A., Black, R. J., Auerbach, J. D., Veronese, F., Struble, K. A., ... & Paxton, L. A. (2005). Antiretroviral postexposure prophylaxis after sexual, injection-drug use, or other nonoccupational exposure to HIV in the United States: recommendations from the US Department of Health and Human Services.
4. Ford, N., Irvine, C., Shubber, Z., Baggaley, R., Beanland, R., Vitoria, M., ... & Calmy, A. (2016). Adherence to HIV postexposure prophylaxis: a systematic review and meta-analysis.
5. Molina, J. M., Capitant, C., Spire, B., Pialoux, G., Cotte, L., Charreau, I., ... & Cua, E. (2015). On-demand preexposure prophylaxis in men at high risk for HIV-1 infection.
6. Calabrese, S. K., Mayer, K. H., Magnus, M., Krakower, D. S., Eldahan, A. I., Gaston Hawkins, L. A., & Dovidio, J. F. (2017). Integrating HIV preexposure prophylaxis (PrEP) into routine preventive health care to avoid exacerbating disparities.
7. Cohen, M. S., Chen, Y. Q., McCauley, M., Gamble, T., Hosseinipour, M. C., Kumarasamy, N., ... & Pilotto, J. H. (2016). Antiretroviral therapy for the prevention of HIV-1 transmission.
8. Spinelli, M. A., & Scott, H. M. (2019). Vaginal Microbicides for the Prevention of HIV Transmission. In Microbicides for the Prevention of HIV Infection (pp. 33-55). Springer, Cham.
9. Fauci, A. S., & Marston, H. D. (2015). Ending AIDS—is an HIV vaccine necessary? New England Journal of Medicine, 373(21), 2054-2057.
10. Robert M. Grant and Dawn K. Smith – Integrating Antiretroviral strategies for Human Immunodeficiency Virus Prevention: Post- and Pre-Exposure Prophylaxis and Early Treatment.
11. Kuhar DT, Henderson DK, Struble KA, et al. Updated US Public Health Service guidelines for the management of occupational exposures to human immunodeficiency virus and recommendations for postexposure prophylaxis. Infect Control Hospital Epidemiol 2013; 34:875–892.
12. New York State AIDS Institute. HIV prophylaxis following nonoccupational exposure, 2013. Available at: http://www.hivguidelines. org/wp-content/uploads/2014/12/hiv-prophylaxis-following-nonoccupational-exposure.pdf. Accessed 2 February 2015.
13. Centres for Disease Control and Prevention, US Public Health Service. Preexposure Prophylaxis for the Prevention of HIV Infection in the United States - 2014: A Clinical Practice Guideline. 2014:1–67. Available at: http://www.cdc.gov/hiv/pdf/guidelines/PrEPguidelines2014. pdf. Accessed 28 May 2014.
14. Marrazzo JM, del Rio C, Holtgrave DR, et al. HIV prevention in clinical care settings: 2014 recommendations of the International Antiviral Society-USA Panel. JAMA 2014; 312:390–409.
15. Grant RM, Liegler T, Defechereux P, et al. Drug resistance and plasma viral RNA level after ineffective use of oral pre-exposure prophylaxis in women. AIDS 2015; 29:331–337.
16. Curtis KA, Kennedy MS, Luckay A, et al. Delayed maturation of antibody avidity but not seroconversion in rhesus macaques infected with simian HIV during oral pre-exposure prophylaxis. J Acquir Immune Defic Syndr 2011; 57:355–362.
17. Jain S, Krakower DS, Mayer KH. The transition from postexposure prophylaxis to preexposure prophylaxis: an emerging opportunity for Grant and Smith bio behavioural HIV prevention. Clin Infect Dis 2015; 60(suppl 3): S200–2004.

DOI:10.31579/2690-4861/445