

# Combatting Antiretroviral Drug Resistance: Strategies and Challenges in HIV Treatment

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## Introduction

Since the emergence of the Human Immunodeficiency Virus (HIV) epidemic, antiretroviral therapy (ART) has revolutionized the management of HIV infection, significantly reducing morbidity and mortality rates worldwide. However, the effectiveness of ART is being challenged by the development of antiretroviral drug resistance, posing a significant obstacle to achieving sustained viral suppression and optimal clinical outcomes. This article delves into the strategies employed to combat antiretroviral drug resistance and the challenges encountered in HIV treatment.

Antiretroviral drug resistance occurs when the virus mutates, rendering antiretroviral medications less effective in controlling viral replication. This phenomenon can arise due to various factors, including poor medication adherence, suboptimal drug levels, drug interactions and viral replication dynamics. Resistance can develop to different classes of antiretroviral drugs, including nucleoside reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse transcriptase inhibitors (NNRTIs), protease inhibitors (PIs) and integrase strand transfer inhibitors (INSTIs).

## Description

### Treatment adherence promotion

Enhancing medication adherence through patient education, counseling and support services is fundamental in preventing the development of drug resistance. Adherence-promoting strategies such as pill reminders, simplified dosing regimens and addressing barriers to adherence are essential components of HIV care [1].

### Early diagnosis of drug resistance

Routine monitoring of viral load and resistance testing enables the early detection of treatment failure and emergence of drug resistance mutations. Prompt identification of resistance patterns allows clinicians to tailor ART regimens to individual patients, optimizing treatment outcomes.

### Optimization of antiretroviral regimens

Selecting potent and well-tolerated antiretroviral regimens based on resistance testing results and treatment history is crucial in combating drug resistance. Combination therapy with drugs from different classes, including newer agents with higher genetic barriers to resistance, can enhance virologic suppression and prevent the emergence of resistance mutations [2].

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## Development of novel antiretroviral agents

Continued research and development efforts are focused on discovering novel antiretroviral agents with distinct mechanisms of action and improved resistance profiles. This includes next-generation NNRTIs, PIs, INSTIs and long-acting injectable formulations, which offer potential advantages in simplifying treatment and overcoming adherence barriers.

## Implementation of treatment as prevention strategies

Scaling up HIV testing and treatment programs, combined with pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) initiatives, can reduce HIV transmission rates and limit the spread of drug-resistant strains within communities. Timely initiation of ART in HIV-infected individuals also reduces the likelihood of transmitting resistant virus strains [3].

## Challenges in HIV treatment

**Access to healthcare services:** Socioeconomic disparities, stigma, discrimination and inadequate healthcare infrastructure pose significant challenges to accessing HIV testing, treatment and care services, particularly in resource-limited settings. Addressing these barriers requires a comprehensive approach that addresses social determinants of health and promotes equity in healthcare delivery.

**Cost and availability of antiretroviral drugs:** The high cost of antiretroviral drugs and limited availability of newer medications in some regions hinder the accessibility of optimal HIV treatment regimens. Strategies such as generic drug production, tiered pricing agreements and international partnerships are essential in ensuring affordability and sustainable access to antiretroviral therapy globally [4].

**Adherence and retention in care:** Adherence to lifelong ART poses challenges for patients, including pill burden, side effects, stigma and psychosocial factors. Retention in care is also influenced by healthcare system factors, including long waiting times, transportation costs and inadequate support services. Multifaceted interventions that address individual, social and structural barriers are needed to improve adherence and retention in HIV care.

Despite advances in HIV treatment, the emergence of drug-resistant virus strains remains a persistent challenge, necessitating ongoing surveillance, research and development efforts. Continuous monitoring of drug resistance patterns, coupled with the development of new antiretroviral agents and treatment strategies, is essential in addressing this evolving threat [5].

## Conclusion

Combatting antiretroviral drug resistance is paramount in ensuring the long-term effectiveness of HIV treatment programs and achieving the goals of the global HIV response. By implementing comprehensive strategies that encompass treatment adherence promotion, early diagnosis of drug resistance, optimization of antiretroviral regimens, development of novel antiretroviral agents and treatment as prevention initiatives, we can mitigate the impact of drug resistance on HIV outcomes. Addressing the underlying challenges in HIV treatment, including access to healthcare services, affordability of medications, adherence and retention in care, is crucial in achieving sustained viral suppression and improving the quality of life for people living with HIV. Through collaborative efforts among governments, healthcare providers, researchers and communities, we can overcome the obstacles posed by antiretroviral drug resistance and advance towards ending the HIV epidemic.

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None.

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## Conflict of Interest

None.

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## References

1. Faria, Nuno R., Andrew Rambaut, Marc A. Suchard and Guy Baele, et al. "The early spread and epidemic ignition of HIV-1 in human populations." *Sci* 346 (2014): 56-61.
2. Nasti, Bianca Maria, Pasquale Pagliano, Carla Zannella and Veronica Folliero, et al. "HIV and drug-resistant subtypes." *Microorgan* 11 (2023): 221.
3. Nyamweya, Samuel, Andrea Hegedus, Assan Jaye and Sarah Rowland-Jones, et al. "Comparing HIV-1 and HIV-2 infection: Lessons for viral immunopathogenesis." *J Med Virol* 23 (2013): 221-240.

4. Esbjörnsson, Joakim, Marianne Jansson, Sanne Jespersen and Fredrik Månsson, et al. "HIV-2 as a model to identify a functional HIV cure." *AIDS Res Ther* 16 (2019): 1-12.
5. Rawson, Jonathan MO, Sean R. Landman, Cavan S. Reilly and Louis M. Mansky, et al. "HIV-1 and HIV-2 exhibit similar mutation frequencies and spectra in the absence of G-to-A hypermutation." *Retroviro* 12 (2015): 1-17.

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