SJIF Impact Factor (2025): 8.688| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 10 | Issue: 6 | June 2025 - Peer Reviewed Journal

PHARMACOECONOMIC ANALYSIS OF HIV/AIDS MANAGEMENT PHARMACY

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ABSTRACT

Human immunodeficiency virus (HIV) infection is a major public health problem in all parts of the world. For the United States, federal spending on HIV disease for 1982 to 1989 Pharmacoeconomic analysis has been used to assess 2 important therapeutic options in caring for HIV patients: zidovudine therapy for asymptomatic illness, and prophylaxis for Pneumocystis carinii pneumonia (PCP). The cost-effectiveness ratio for zidovudine therapy, $US6553 to $US70 526 per year of life saved, compares favourably with ratios for other medical therapies. Prophylaxis against Pneumocystis carinii pneumonia has been shown to be most efficient using oral dapsone or cotrimoxazole (trimethoprim-sulfamethoxazole). Pharmacological therapy for HIV is costly, however, and may limit the access to new therapies for patients in the developing world. Concurrent economic assessment of therapies during phase III trials may serve as an essential part of the research.

In patients with human immunodeficiency virus (HIV) infections or the acquired immunodeficiency syndrome (AIDS), zidovudine is a first-line therapy that reduces morbidity and may reduce mortality. By delaying progression to AIDS, the drug reduces the duration and incidence of hospitalisations in a given time period, resulting in overall decreases in the cost of medical treatment per unit of survival time. In current therapeutic dosages zidovudine is generally well tolerated. Most pharmacoeconomic and quality-of-life studies of this agent were conducted.
using data relating to higher dosages and higher drug acquisition costs than those currently applicable, but nevertheless generally support the cost-effectiveness of zidovudine in patients with HIV disease. Studies examining the use of the drug in higher dosages demonstrate neither clear positive nor negative effects of the drug on quality of life. The cost effectiveness of the drug as prophylaxis against seroconversion after occupational exposure to HIV is dependent primarily on the establishment of clinical effectiveness in this condition.

pharmacoeconomic studies should examine changes to dosage and cost factors, along with direct nonmedical treatment costs, indirect medical treatment costs and the effects of the drug on quality of life. An evaluation of existing studies suggests that if these factors were accounted for, zidovudine might be shown to be more clearly cost effective, and indeed its use in the treatment of patients with HIV disease might be found to result in cost savings. The management of HIV/AIDS has evolved significantly over the past few decades, with the advent of antiretroviral therapy (ART) improving the prognosis and quality of life for millions of people living with the virus. However, the long-term treatment of HIV/AIDS presents substantial economic challenges to healthcare systems globally. Pharmacoeconomic analysis, which evaluates the cost-effectiveness, cost-utility, and cost-benefit of healthcare interventions, plays a critical role in optimizing resource allocation in HIV/AIDS management. This abstract examines the pharmacoeconomic considerations involved in the pharmacy management of HIV/AIDS, focusing on the cost implications of ART, the role of pharmacists in improving medication adherence, and strategies to minimize healthcare costs while maximizing patient outcomes. Pharmacoeconomic studies in HIV/AIDS management assess the economic burden of antiretroviral drugs, including direct medical costs, patient adherence strategies, and long-term care requirements for individuals living with HIV. The analysis often compares the cost-effectiveness of different ART regimens, the impact of early initiation of therapy, and the cost-benefit of preventive measures such as pre-exposure prophylaxis (PrEP). Additionally, the role of pharmacy services in improving medication adherence, reducing drug resistance, and managing side effects is crucial in reducing both direct and indirect costs associated with HIV care. Key findings from pharmacoeconomic evaluations indicate that while the upfront costs of ART can be high, early and consistent treatment can lead to better longterm health outcomes, including reduced hospitalizations and decreased transmission rates, ultimately providing savings in the broader healthcare system. Moreover, strategies such as generic drug use, medication synchronization, and tele pharmacy can further enhance the cost-effectiveness of HIV/AIDS management. In conclusion, pharmacoeconomic analysis provides valuable insights into the economic aspects of HIV/AIDS treatment and highlights the importance of costeffective interventions in optimizing patient care. The role of pharmacy management in this context is pivotal, as it not only improves

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clinical outcomes but also ensures the sustainability of HIV/AIDS care programs, particularly in resource-limited settings. This analysis is essential for informing healthcare policy, guiding treatment decisions, and improving the accessibility and affordability of HIV/AIDS care worldwide.

KEYWORDS: - *Pharmacoeconomics, HIV/AIDS, Antiretroviral Therapy (ART), HIV Prevention Strategies, Factors about the Pharmacoeconomics*

Fig; Protect by HIV

AIMS & OBJECTIVES

1. *Suppress viral replication*: Reduce HIV viral load to undetectable levels.
2. *Restore and maintain immune function*: Help the immune system recover by increasing CD4 T-cell counts.
3. *Prevent HIV-related illnesses and co-infections*: Lower the risk of opportunistic infections
4. *Reduce transmission*: Undetectable viral load means a greatly reduced risk of sexual or perinatal transmission

HIV Prevention strategies aims to reduce the risk of HIV transmission and acquisition. These strategies can be grouped into biomedical Strategies, behavioral strategies, and structural approaches.

INTRODUCTION

A pharmacoeconomic analysis of HIV/AIDS management in pharmacy aims to assess the cost-effectiveness and cost-benefit of various treatment strategies for HIV patients, taking into account the economic impact on healthcare systems, patients, and society.

As of 2020, approximately 37.7 million people globally are living with the human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS).

1. Of these, more than 50% are from low-and middle-income countries (LMICs).
2. The socioeconomic burden of HIV/AIDS is no-table because of the significant strain and cost incurred on people living with HIV/AIDS (PLWHA), their relatives, and the community.
3. Between 2000 and 2015, $562.6 billion was spent on HIV/AIDS, and, in 2015 alone, $48.9 billion was spent on HIV/AIDS prevention, care, and treatment worldwide.
4. Furthermore, between 2000 and 2016, HIV/AIDS pre-vention investment increased by 519.6%, from $596 million to $3billion.
5. On the other hand, AIDS-related deaths have decreased by 39%since 2010, owing primarily to the introduction of highly active antiretroviral therapy (HAART) in the early 2000s. The end of the AIDS threat by2030 and the achievement of UNAIDS 95–95-95 targets will largely depend on the effectiveness of the current antiretroviral therapy (ART), which will contribute to viral

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suppression, reduction in the spread of the virus, and prevention of AIDS-related deaths.

HIV is a retrovirus that infects cells of the immune system, destroying or impairing their functions (WHO, 2008). HIV has a high affinity for the cluster of differentia 4 (CD4) receptor on T lymphocytes and its major effect on the immune system is a progressive depletion of CD4 T lymphocytes (Martindale, 2008).

Thus, infection is followed by development of anti-HIV antibodies known as seroconversion, during which the patient may remain asymptomatic or have transient symptoms such as rash, sore throat, and lymphadenopathy (Martindale, 2008). Despite the presence of the anti-HIV antibodies, the infection progresses over a period of months to several years ultimately resulting to a persistent generalized lymphadenopathy (lymphadenopathy syndrome)

A more serious collection of symptoms known as AIDS-related complex (ARC), which include fatigue, weight loss, recurrent fever, diarrhoea, and persistent opportunistic infections (Martindale, 2008). AIDS is characterised by severe impairment of the immune system leading to the development of secondary infections - opportunistic infections (OIs) which could be life-threatening and include *Pneumocystis carinii* pneumonia (PCP)

Toxoplasma encephalitis, oropharyngeal and oesophageal candidiasis, cryptococcal meningitis, cytomegalovirus retinitis, and tuberculosis (TB), or to secondary neoplasms such as Kaposi's sarcoma, primary central nervous system (CNS) lymphomas, invasive cervical cancer, and non-Hodgkin's lymphoma. Other complications may include dementia and thrombocytopenia (Martindale,2008).

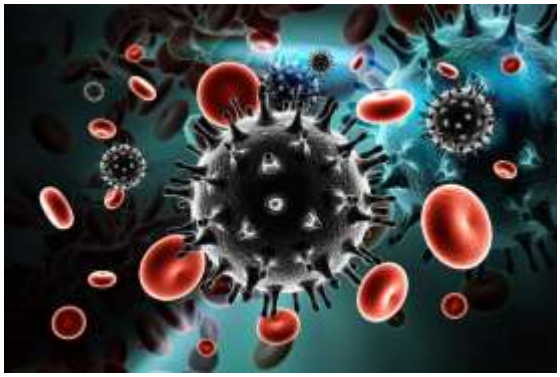

Fig :HIV

Assess the Economic Burden of antiretroviral drugs

Pharmacoeconomic studies in HIV/AIDS management assess the economic burden of antiretroviral drugs, including direct medical costs, patient adherence strategies, and long-term care requirements for individuals living with HIV.

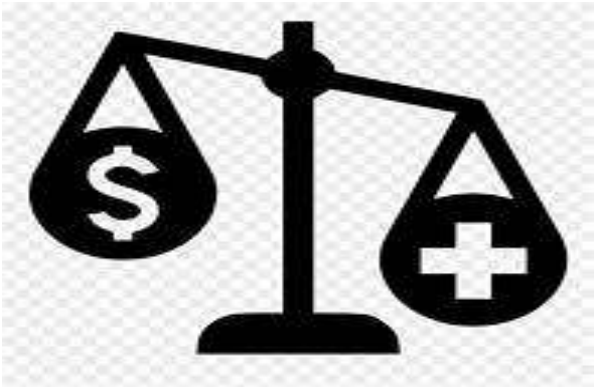

Fig : Health Management Assess the economic

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Infects the cells of a living organism and it is found in blood and other body fluids. The virus cannot live for long outside the body consequently; the body fluid from an infected person has to come in contact with another person‘s body fluid to complete the process of transmission. The routes through which HIV can thus be transferred include;
Exposure to infected blood or blood products Perinatally from an infected mother to herbaby. Though the virus has been isolated from blood, semen, vaginal secretions, breast milk, saliva, tears, Cerebrospinal fluid, amniotic fluid and urine, evidence has shown that transmission occur in the first four, in urine and amniotic fluid only when it contains visible blood and with saliva only when large volumes are exchanged (Kennedy *et al*., 2009).

Two methods of transmission occur: horizontal and vertical.
Horizontal Transmission: the virus is transmitted from one person to another (direct contact). It could be through Unprotected sexual intercourse (vaginal, anal, and oral) with an HIV infected person. Studies have shown that the receptive partner in intercourse has a greater chance of acquiring HIV than the insertive partner. Other factors associated with an increased risk of HIV infection are exposure to blood such as genital ulcer disease, trauma during sex, menstruation of the HIVinfected woman and exposure to inflammation of the genital or rectal mucosa which can occur with sexually transmitted infections (STIs).
Sharing of drug needles or syringes with an HIV-infected person: a study has shown this to have an approximate risk of 0.67% perexposure.

Contamination of mucous membranes or break in the skin: This is mostly suffered by health worker when they are in contact with infected individuals. As reported by Russel *et al*. (2004), a study has shown that the overall risk of HIV infection after percutaneous exposure to infected blood is 0.3% and after mucous membrane exposure is0.09%.

Vertical Transmission: this is usually between a mother and her infant and occurs at various stages during the perinatal period;
During ante partum/pregnancy: this mostly occurs through the placenta. It may occur after placental disruption as in placental abruption or during amniosynthesis.

- **Statement Problem**

Over the past 25 years, nearly 25 million people have died from AIDS. HIV/AIDS has caused debilitating illness and premature death in people during their prime years of life and has devastated families and communities. It has complicated efforts to fight poverty, improve health, and promote development especially in the developing countries which are most affected by theepidemic.

HIV/AIDS diminishes a person‘s ability to support, work and provide for his or her family. Also the treatment and health-care costs related to HIV/AIDS consume household incomes in developed countries as well as in developing countries. Though the anti-retroviral drugs may be ―free‖ in developing countries, the overall costs as a result of OIs are more than a number of infected individuals can contend with. The combined effect of reduced income and increased costs impoverishes individuals and households.

HIV/AIDS deepens socioeconomic and gender disparities. Women are at high risk of infection and have few options for providing for their families. Children affected by HIV/AIDS, due to their own infection or parental illness or death, are less likely to receive an education, as they leave school to care for ailing parents and younger siblings or lose their educational sponsors. The impact of HIV/AIDS on women and girls has been particularly devastating given the epidemiologic data. And this cannot be overemphasized. The children represent a generation and their loss would present with a myriad of economic problems; the women are equally asimportant.

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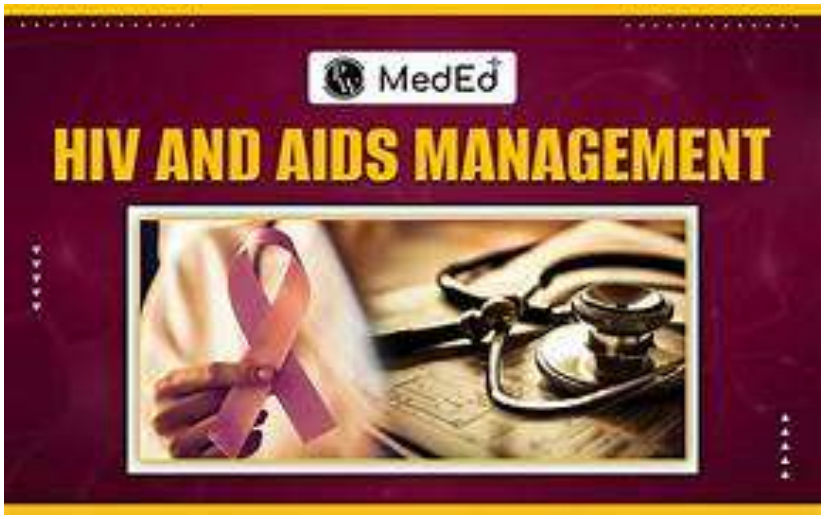

Fig: HIV Management

1. Factors Militating against Accessing ART and HIVCare.
2. Stigma: individuals are inclined to hide the sickness from their boss, spouse or partner, family and community because of the stigma associated with HIV/AIDS. This may keep them from seeking VCT or ART services out of fear of repercussions from disclosure, from peers, clients andco-workers.
3. Lack of resources and access to HIV/AIDS treatment and care: Many individuals in need of medication lack access to ARVs either because they live in rural or remote areas far from a health centre with no money for transportation or because they are not aware of theirstatus.
4. Lack of power and control (women): In most developing countries men are the sole breadwinners in a household hence women are afraid of blame, physical abuse or abandonment after disclosing their infection to their husband or partner. The laws in many countries leave women without property or inheritance rights and these fears make women keep their status a secret, exposing themselves, their children and spouses to severe ill health by not accessing proper HIV/AIDS management andcare.
5. Lack of other medications: HIV as mentioned earlier attacks the immune system as such infected individuals suffer a number of opportunistic and related infections, such as TB, malaria, Hepatitis C, pneumonia or cancer. Access to drugs for these may be difficult as they may not be available at local health centres. In patients opportune to have health insurance policies (example NHIS), the fragmented state of our health care system which does not reconcile patient medical history does not allow them fully to benefit from thesepolicies.
6. Lack of access to nutrition and clean water: ARVs alone are not enough to combat ill health. The decline in immunity could benefit from a number ofgood hygiene (food, personal and environmental) as such adequate nutrition is an integral complement to treatment. Famines, droughts, political events and loss of ability to farm (in cases of morbidity) may reduce supplies of food and clean water. Lack of access to these basic necessities is particularly harmful to pregnant women, children and those on ARV therapy. Generally, a proper diet reduces growth and developmental deficits among children and unwanted weight loss among adults. Clean water is essential for some paediatric formulations ofARVs.
7. Uncertainty of the future: People living with HIV may have to deal with delays in or diminished supplies of their ARVs, increasing the possibility of developing resistance to their drugs and the necessity for costly second-line drugs. Governments may lack the will and the resources to secure sustainable sources of ARVs and to build capacity for the provision of care and treatment. The issue of sustainability of programs especially health care programs has been a problem in developing countries. In order to tackle this, most care programs are integrated into existing health institutions. Doing that alone will not solve the problem as the institutions already have their finances stretched. Integrating it in health insurance programs would go a long way in providing quality health care to individuals with only immediate worry for food, utility and other basic necessities.

Hypothesis

This abstract examines the pharmacoeconomic considerations involved in the pharmacy management of HIV/AIDS, focusing on the cost implications of ART, the role of pharmacists in improving medication adherence, and strategies to minimize healthcare costs while maximizing patient outcomes.

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Pharmacoeconomics, which evaluates the cost-effectiveness, cost-utility, and cost-benefit of drug therapies, plays a crucial role in the management of HIV/AIDS. By assessing the value of various treatment options, pharmacoeconomic analysis helps healthcare providers, policymakers, and stakeholders make informed decisions about resource allocation.

This is especially important in the context of HIV/AIDS, where the long-term nature of treatment regimens and the need for continuous medication can lead to significant healthcare costs. Incorporating pharmacoeconomic perspectives into HIV/AIDS management can help optimize treatment strategies, reduce unnecessary healthcare expenditures, and improve patient outcomes. Moreover, it supports equitable access to effective treatment in resource-limited settings, where the impact of HIV is disproportionately high. This analysis will explore the economic implications of HIV/AIDS treatment regimens, examining their costeffectiveness, and providing a framework for policymakers and healthcare providers to make data-driven decisions in HIV care.

Materials & Methods

Pre-Exposure Prophylaxis (PrEP) - Daily oral medication (e.g., tenofovir/emtricitabine) to prevent HIV infection in individuals at high risk. –

1. Long-acting injectable PrEP (e.g., cabotegravir) is also available for people unable to take daily pills. - Highly effective when used consistently, reducing the risk by over 90% during sexual contact and 70% among people who inject drugs.
2. Post-Exposure Prophylaxis (PEP) - Emergency use of antiretroviral drugs within 72 hours of potential HIV exposure. – A 28-day regimen that significantly reduces the risk of infection when taken as prescribed.
3. Condom Use - Male and female condoms provide a barrier against HIV and other sexually transmitted infections (STIs). - Highly effective when used correctly and consistently.
4. Treatment as Prevention (TasP) - Ensuring people living with HIV take antiretroviral therapy (ART) to achieve and maintain an undetectable viral load. - Undetectable viral load means no risk of sexual transmission (U=U: Undetectable = Untransmutable).
5. Voluntary Medical Male Circumcision (VMMC) - Reduces the risk of female-to-male sexual transmission of HIV by approximately 60%. - Particularly recommended in high-prevalence areas.
6. Needle and Syringe Programs (NSPs) - Provide sterile injecting equipment to people who inject drugs to prevent transmission via shared needles
7. Harm Reduction for Drug Users - Includes opioid substitution therapy (OST) and access to clean injection tools. 8. Maternal and Child Health Interventions - ART for pregnant women living with HIV reduces the risk of mother-to-child transmission to less than 1%. - Safe breastfeeding practices combined with ART can further reduce transmission risks.

1. Reducing Stigma and Discrimination –
   1.Fostering inclusive environments to encourage individuals to seek prevention services without fear.
   2. Access to Healthcare Services - Ensuring affordable and equitable access to HIV prevention tools and care.
   3. Legislative and Policy Reforms - Decriminalizing sex work, drug use, and same-sex relationships to improve access to prevention services.
   4. Community Engagement - Collaborating with local communities to develop culturally appropriate prevention programs.
   5. Economic Empowerment - Providing opportunities for economic stability can indirectly reduce HIV risk by addressing underlying vulnerabilities.

HIV PREVENTION STRATEGIES HIV Prevention strategies

Aims to reduce the risk of HIV transmission and acquisition.
These strategies can be grouped into biomedical Strategies, behavioral strategies, and structural approaches.

BIOMEDICAL STRATEGIES

Pre-Exposure Prophylaxis (PrEP) - Daily oral medication (e.g., tenofovir/emtricitabine) to prevent HIV infection in individuals at high risk. - Long-acting injectable PrEP (e.g., cabotegravir) is also available for people unable to take daily pills. - Highly effective when used consistently, reducing the risk by over 90% during sexual contact and 70% among people who inject drugs

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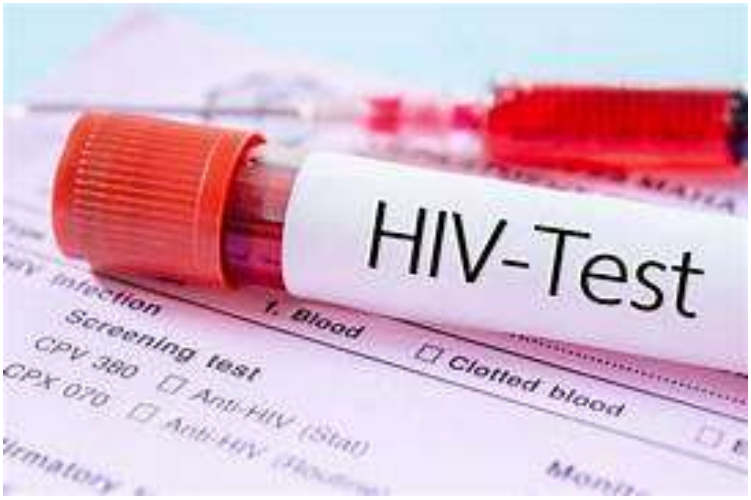
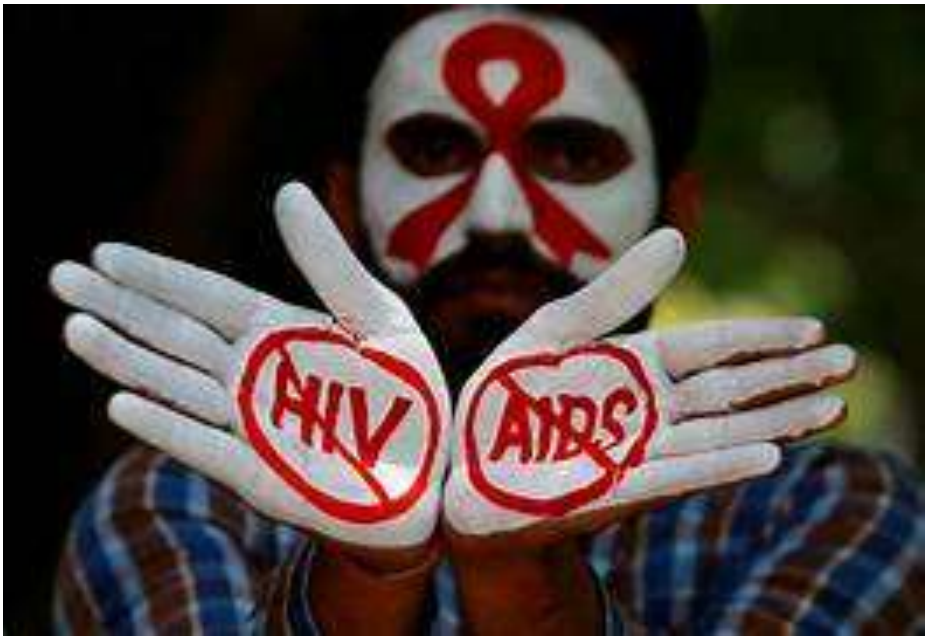


Fig : HIV Prophylaxis



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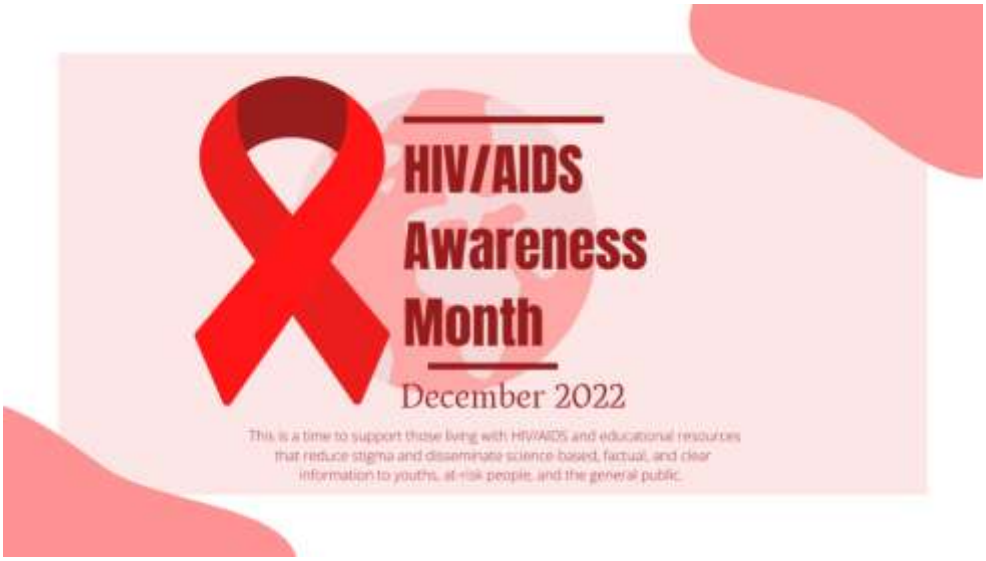

Fig : Public Awareness

RESULTS

Patients given early treatment with zidovudine remained without AIDS for an extra two months at a cost of $10,750 for each extra month without AIDS (at 1991 costs). Cost effectiveness ratio was most sensitive to the cost of zidovudine and to the quality of life of patients receiving early treatment. At treatment of 500 mg/day the cost effectiveness ratio for early treatment was $5432 for each extra month without AIDS. Patients given early treatment experienced more side effects Efforts to address global health disparities focus on improving access to healthcare, enhancing education, addressing social determinants of health, and ensuring equitable distribution of resources.

CONCLUSION

A pharmacoeconomic analysis of HIV/AIDS management in pharmacy aims to assess the cost-effectiveness and cost-benefit of various treatment strategies for HIV patients, taking into account the economic impact on healthcare systems, patients, and society. The conclusion of such an analysis typically reflects the balance between treatment costs and health outcomes, offering valuable insights for policy decisions and the allocation of resources. Pharmacoeconomic analysis in HIV/AIDS management helps inform healthcare policy, optimize the allocation of resources, and guide clinicians in selecting the most cost-effective treatment strategies. It supports better healthcare access, reduces unnecessary costs, and ensures improved patient outcomes, ultimately contributing to better global health management for HIV/AIDS.

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