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Case Report

Breaking the Delay: Stage III HIV Diagnosis and Successful Recovery at the Primary Healthcare Level

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ABSTRACT

Human Immunodeficiency Virus (HIV) remains a major public health problem, particularly when diagnosis occurs at an advanced stage. This case report describes a 24-year-old male diagnosed with WHO stage III HIV infection at a primary health care facility in the absence of CD4 count and baseline viral load due to resource limitations. The patient presented with oral candidiasis, chronic diarrhea, prolonged fever, and significant weight loss, alongside high-risk sexual behavior. HIV and syphilis serology were reactive, while tuberculosis was excluded despite strong clinical suspicion. The patient was managed with antifungal therapy, syphilis treatment, and first-line antiretroviral therapy (ART). Significant clinical improvement was observed within one month, and viral load decreased to 60 copies/mL at six months, indicating near-complete virological suppression. This case highlights missed opportunities for early HIV diagnosis, supports the use of WHO clinical staging as a surrogate in resource-limited settings, and demonstrates that effective HIV management can be achieved at the primary care level.



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INTRODUCTION

Human Immunodeficiency Virus (HIV) remains a major global public health challenge despite substantial progress in prevention, diagnosis, and antiretroviral therapy (ART). HIV infection leads to progressive immune system deterioration through the depletion of CD4+ T lymphocytes, resulting in increased vulnerability to opportunistic infections and malignancies. Globally, an estimated 40.8 million people were living with HIV at the end of 2024, with approximately 1.3 million new infections reported in the same year, indicating that HIV transmission remains ongoing despite expanded treatment coverage (Beyrer et al., 2025; WHO, 2025).

In Indonesia, HIV continues to pose a significant public health burden. The country ranks among those with the highest numbers of people living with HIV in the Asia-Pacific region, with many cases still being diagnosed at advanced clinical stages. National data indicate that a substantial proportion of patients present late, often at WHO clinical stage III or IV, which is associated with higher morbidity, increased health care costs, and poorer clinical outcomes (Kemenkes RI, 2025). Stage III HIV is characterized by significant immunosuppression accompanied by clinical manifestations such as unexplained weight loss exceeding 10%, chronic diarrhea, prolonged fever, and opportunistic infections, including oral candidiasis (Patel et al., 2022; Pitchumoni and Brun, 2024, 2025).

Primary health care facilities play a critical role in early HIV detection; however, many patients in Indonesia continue to present at advanced stages. Late diagnosis is associated with increased morbidity and reflects missed opportunities for earlier screening. This case report aims to describe a single patient with stage III HIV diagnosed at the primary care

level, emphasizing indicator-condition guided testing and challenges in resource-limited settings.

CASE REPORT

A 24-year-old male presented to Prabumulih Timur Primary Health Center with a two-month history of recurrent oral ulcers characterized by white plaques in the oral cavity. The symptoms were accompanied by chronic productive cough, diarrhea lasting more than one month, intermittent fever predominantly at night, night sweats, decreased appetite, and a marked weight loss of 20 kg over the preceding two months. The patient also reported generalized weakness that interfered with daily activities. He had no significant past medical history; however, detailed history taking revealed high-risk sexual behaviors, including sexual intercourse with men, multiple sexual partners, and inconsistent condom use. A history of painless genital ulcer several months prior that resolved spontaneously suggested a previous untreated sexually transmitted infection.

Physical examination revealed a moderately ill patient with diffuse, removable white plaques on the oral mucosa, consistent with oral candidiasis. Laboratory investigations showed reactive HIV serology using a three-reagent testing algorithm, along with reactive syphilis serology. Chest radiograph demonstrating normal cardiac and pulmonary findings, with no evidence of infiltrates, nodules, or pleural effusion, indicating no radiographic signs of active pulmonary tuberculosis.

Evaluation for tuberculosis, including chest radiography and molecular rapid testing, showed no evidence of active disease. Based on clinical manifestations such as unintentional weight loss greater than 10%, chronic diarrhea, prolonged fever, and oral candidiasis, the patient was diagnosed with World Health Organization (WHO) stage III HIV infection



Figure 1. Clinical appearance of oral candidiasis in a patient with stage III HIV infection, showing diffuse whitish-yellow plaques on the dorsal surface of the tongue with an erythematous base, consistent with an opportunistic infection related to immunosuppression.

Table 1. Serological test results of the patient demonstrated reactive HIV screening using a three-reagent algorithm and a reactive syphilis test. These findings confirm the diagnosis of HIV infection with concomitant syphilis, which has important clinical implications for disease progression and patient management.

No	Type of Examination	Result	Reference Value
1	HIV	Reactive	Negative
	HIV 1	Reactive	Negative
	HIV 2	Reactive	Negative
	HIV 3	Reactive	Negative
2	Syphilis	Reactive	Negative

Table 2. Molecular rapid test (Xpert MTB/RIF) result showing *Mycobacterium tuberculosis* not detected, indicating no evidence of active tuberculosis in this HIV patient.

Assay Information					
Assay		Assay Version		Assay Type	
Xpert MTB-RIF Ultra		4		In Vitro Diagnostic	
Test Result: MTB NOT DETECTED					
Analyte Result					
Analyte Name	Ct	EndPt	Analyte Result	Probe Result	Check
SPC	22.9	201	PASS	PASS	
IS1081-IS6110	0.0	5	FAIL	PASS	
rpoB1	0.0	8	INVALID	PASS	
rpoB2	0.0	4	INVALID	PASS	
rpoB3	0.0	8	INVALID	PASS	
rpoB4	0.0	5	INVALID	PASS	



Figure 2. Clinical improvement of oral candidiasis on day three of antifungal therapy, characterized by a marked reduction of whitish plaques on the dorsal surface of the tongue and decreased mucosal erythema.



Figure 3. Complete clinical resolution of oral candidiasis after one month of therapy, with absence of whitish plaques on the dorsal tongue and normal-appearing oral mucosa.



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Table 3. HIV viral load examination performed after six months of ART revealed a value of 60 copies/mL, indicating successful virological suppression and reflecting an adequate therapeutic response with good treatment adherence.

Assay Information					
Assay		Assay Version		Assay Type	
Xpert_HIV-1 Viral Load		2		In Vitro Diagnostic	
Test Result: HIV-1 DETECTED 60 copies/mL (log 1.78)					
Analyte Result					
Analyte Name	Ct	EndPt	Analyte Result	Probe Result	Check
HIV-1	39.1	112	PASS	PASS	
IQS-H	23.3	175	PASS	PASS	
IQS-L	34.0	284	PASS	PASS	

Table 4. Summary of the patient's clinical progression

Date	Timeframe	Key Clinical Findings	Key Interventions
Day 1 (June 16, 2025)	Initial presentation (at primary health center visit)	Recurrent oral candidiasis, chronic productive cough, chronic diarrhea (>1 month), intermittent nocturnal fever, night sweats, severe weight loss (20 kg in 2 months), generalized weakness; history of high-risk sexual behavior and prior painless genital ulcer	Comprehensive history taking, physical examination, HIV and syphilis serological testing, tuberculosis evaluation (chest X- ray and Xpert MTB/RIF)



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Date	Timeframe	Key Clinical Findings	Key Interventions
	Diagnostic evaluation	Reactive HIV serology (three-reagent algorithm), reactive syphilis serology; no evidence of active tuberculosis on molecular testing and chest radiography	Diagnosis of WHO stage III HIV infection with concomitant syphilis
Day 2 (June 17, 2025)	Initial management (baseline treatment)	Oral candidiasis and confirmed HIV–syphilis co-infection	Intramuscular benzathine penicillin G for syphilis; systemic fluconazole and topical nystatin for oral candidiasis; initiation of first-line ART (tenofovir, lamivudine, efavirenz); adherence and risk-reduction counseling
Day 3 (June 18, 2025)	Day 3 after initiation of therapy	Marked reduction of whitish plaques on the dorsal tongue, decreased mucosal erythema, and early clinical improvement of oral candidiasis	Continuation of systemic fluconazole and topical nystatin; monitoring of treatment response and tolerance
Month 1 (July 14, 2025)	Early follow-up (1 month after ART initiation)	Complete resolution of oral candidiasis, improved general condition, weight gain of 3 kg, no significant ART-related adverse effects	Continuation of ART; reinforcement of adherence and regular follow-up
Month 6 (December 15, 2025)	Mid-term follow-up (6 months after ART initiation)	Viral load suppressed to 60 copies/mL; total weight gain of 9 kg from baseline; marked clinical and nutritional improvement	Continued ART with routine virological and clinical monitoring



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with concomitant syphilis. HIV testing was performed during the initial visit following identification of clinical indicator conditions. Partner notification and tracing were advised; however, documentation of partner testing was not available.

Management was initiated in accordance with national guidelines and included intramuscular benzathine penicillin G for syphilis, systemic and topical antifungal therapy with fluconazole and nystatin for oral candidiasis, and initiation of first-line ART consisting of tenofovir, lamivudine, and efavirenz. Comprehensive counseling regarding treatment adherence, safer sexual practices, and the importance of regular follow-up was provided. Clinical evaluation after one month of ART demonstrated significant improvement, with complete resolution of oral candidiasis, stabilization of general condition, and a weight gain of 3 kg without significant drug-related adverse effects.

Further evaluation after six months of ART showed an excellent virological and clinical response. Plasma HIV viral load testing revealed a level of 60 copies/mL, indicating adequate viral suppression. In addition, the patient achieved a total weight gain of 9 kg compared to baseline at diagnosis, reflecting substantial improvement in nutritional status and overall health associated with good adherence to therapy.

This case highlights that stage III HIV infection may still present in primary health care settings with relatively nonspecific clinical manifestations. The presence of oral candidiasis, chronic diarrhea, and significant weight loss in individuals with high-risk sexual behaviors should prompt early HIV testing. Timely diagnosis, comprehensive screening for sexually transmitted infections, early initiation of ART, and continuous follow-up at the primary care level play a crucial role in achieving viral suppression and improving clinical outcomes.



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DISCUSSION

This case provides several clinically relevant insights. First, it demonstrates that WHO stage III HIV can be diagnosed at the primary care level using clinical indicators alone, in the absence of immunological parameters. Second, despite strong suspicion, tuberculosis was excluded, highlighting the importance of differential diagnosis in HIV patients with respiratory symptoms. Third, the patient achieved rapid clinical and virological improvement following timely ART initiation, with viral load reaching 60 copies/mL within six months, consistent with expected treatment outcomes (Patel et al., 2022; Chun et al., 2023; Rutstein et al., 2025).

Oral candidiasis is characterized by diffuse, removable white plaques in the oral cavity, reflecting impaired cell-mediated immunity. It is one of the most common opportunistic infections in patients with stage III HIV and is associated with declining CD4 cell counts. Oral candidiasis is widely recognized as an early clinical marker of immunosuppression and disease progression, particularly in settings with limited laboratory capacity (Haorah et al., 2025; Wang and Lu, 2025; Zhang et al., 2025).

The patient also presented with chronic diarrhea, prolonged fever, and unintentional weight loss exceeding 10%, which are defining features of WHO stage III HIV. These symptoms are multifactorial in origin, related to persistent immune activation, secondary infections, and malabsorption, all of which contribute to weight loss and fatigue (Wong et al., 2020; Cribbs et al., 2025).

A history of chronic productive cough initially raised suspicion of pulmonary tuberculosis, which is the most common opportunistic infection among people living with HIV in Indonesia. However, chest X-ray and molecular

rapid testing (TCM) showed no evidence of active tuberculosis. Therefore, other causes such as recurrent bacterial infections or chronic bronchitis should be considered (Menteri et al., 2022; Menteri Kesehatan Republik Indonesia, 2022; Chéret, 2025).

Sexual behavior is a major risk factor for HIV transmission, particularly among individuals with multiple partners and inconsistent condom use. The patient's history of same-sex sexual activity and multiple partners represents well-established risk factors (Beyrer et al., 2025; Fatokun et al., 2025). In addition, reactive syphilis serology highlights the strong association between HIV and sexually transmitted infections (STIs), emphasizing the importance of integrated HIV–STI screening in primary care settings (Pitchumoni and Brun, 2024; Fatokun et al., 2025).

Delayed diagnosis in this case reflects a common pattern in HIV care, where patients present at advanced stages. Contributing factors include low risk perception, stigma, and limited routine screening. Following diagnosis and initiation of antiretroviral therapy (ART), follow-up should include clinical monitoring, assessment of treatment adherence, and evaluation of CD4 count and viral load when available. Ongoing screening for opportunistic infections and STIs is also essential, along with behavioral education and psychosocial support to ensure sustained engagement in care (Wong et al., 2020; Chun et al., 2023; Cribbs et al., 2025).

Pre-exposure prophylaxis (PrEP) is an effective HIV prevention strategy for individuals at high risk, particularly when used consistently (Murchu et al., 2022; Hanum et al., 2025).

The absence of CD4 count and baseline viral load represents a limitation due to resource constraints. In such settings, WHO clinical staging remains a practical surrogate for assessing disease severity, although it may lack



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precision compared to immunological markers (Haorah et al., 2025; Rutstein et al., 2025; Zhang et al., 2025).

Initiation of first-line ART (tenofovir, lamivudine, and efavirenz) was consistent with national and WHO guidelines. Rapid clinical improvement within one month, including resolution of oral candidiasis and weight gain, indicates a favorable treatment response. With optimal adherence, the long-term prognosis for patients with stage III HIV has significantly improved (Menteri Kesehatan Republik Indonesia, 2022; Wang and Lu, 2025; Zhang et al., 2025).

The observed viral load of 60 copies/mL at six months indicates near-complete virological suppression, aligning with expected ART outcomes. Early viral suppression is associated with reduced transmission risk and improved long-term prognosis. However, patients initiating ART at advanced stages remain at risk for immune reconstitution inflammatory syndrome (IRIS), particularly in the first months of therapy, although this was not observed in this case (Kemenkes RI, 2019; Hareru et al., 2025).

Delayed diagnosis in this patient may reflect broader structural and behavioral barriers, including stigma, low risk perception, and limited access to routine HIV screening. Individuals engaging in high-risk sexual behavior often face discrimination, which may discourage early testing and healthcare utilization. Strengthening provider-initiated testing and reducing stigma in primary care settings are critical to improving early detection (Baker, Hijazi and Nandakumar, 2025; Chang et al., 2025; Shen et al., 2025).

This case is unique in demonstrating successful HIV diagnosis and management at the primary care level without access to CD4 count or baseline viral load. It highlights missed

opportunities for earlier detection, the role of indicator-condition guided testing, and the feasibility of achieving rapid virological suppression in resource-limited settings.

As a single case report, this study cannot be used to establish causal relationships or be generalized to the entire population of patients with HIV. The absence of laboratory data such as baseline CD4 counts also limits the objective assessment of immunological status and treatment response. Nevertheless, this report provides a real-world depiction of the clinical presentation of stage III HIV in a primary health care setting and underscores the importance of clinical vigilance.

CONCLUSION

This case underscores the importance of recognizing clinical indicator conditions for HIV in primary care. Early testing, timely initiation of ART, and addressing behavioral and structural barriers are essential for reducing delayed diagnosis and improving patient outcomes.

REFERENCES

- Baker, S., Hijazi, M. and Nandakumar, A.K. (2025) 'Innovative approaches to HIV/AIDS financing: lessons learned from the Sustainable Financing Initiative (SFI)', *BMC health services research*, 24(Suppl 1). Available at: <https://doi.org/10.1186/S12913-025-12529-8>.
- Beyrer, C. *et al.* (2025) 'The HIV/AIDS pandemic: where are we now?', *AIDS (London, England)*, 39(11), pp. 1497–1504. Available at: <https://doi.org/10.1097/QAD.0000000000004308>.
- Chang, J. *et al.* (2025) 'Integrating HIV/AIDS services into financial protection systems to increase sustainability of the HIV/



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- AIDS response', *BMC health services research*, 24(Suppl 1). Available at: <https://doi.org/10.1186/S12913-025-12528-9>.
- Chéret, A. (2025) 'Acute HIV-1 Infection : Paradigm and Singularity', pp. 1–23.
- Chun, H.M. *et al.* (2023) ' Vital Signs : Progress Toward Eliminating HIV as a Global Public Health Threat Through Scale-Up of Antiretroviral Therapy and Health System Strengthening Supported by the U.S. President's Emergency Plan for AIDS Relief — Worldwide, 2004–2022 ', *MMWR. Morbidity and Mortality Weekly Report*, 72(12), pp. 317–324. Available at: <https://doi.org/10.15585/mmwr.mm7212e1>.
- Cribbs, S.K. *et al.* (2025) 'Pathogenesis Of Hiv-Related Lung Disease : Immunity, Infection, and Infammation', *American Physiological Society*, 100, pp. 603–632. Available at: <https://doi.org/10.1152/physrev.00039.2018>.
- Fatokun, B.S. *et al.* (2025) 'Psychiatric comorbidities in HIV/AIDS patients and its overlap with neurological disorders', *Discover mental health*, 5(1). Available at: <https://doi.org/10.1007/S44192-025-00308-0>.
- Fauci, A.S. and Folkers, G.K. (2025) 'Treatment and prevention of HIV/AIDS: Unfinished business', *PLoS medicine*, 22(12), p. e1004806. Available at: <https://doi.org/10.1371/JOURNAL.PMED.1004806>.
- Hanum, N. *et al.* (2025) 'HIV incidence and adherence after pre-exposure prophylaxis initiation in key populations in Indonesia: Findings from a real-world pilot program 2021-2023', *IJID Regions*, 14(July 2024), p. 100573. Available at: <https://doi.org/10.1016/j.ijregi.2025.100573>.
- Haorah, J. *et al.* (2025) 'Neurological impact of HIV/AIDS and substance use alters brain function and structure', *Frontiers in medicine*, 11. Available at: <https://doi.org/10.3389/FMED.2024.1505440>.
- Hareru, H.E. *et al.* (2025) 'Satisfaction with HIV/AIDS treatment and care services and its associated factors among adult people receiving antiretroviral therapy in Ethiopia: a systematic review and meta-analysis', *BMJ open*, 15(2). Available at: <https://doi.org/10.1136/BJMOPEN-2024-085169>.
- Kemenkes (2022) 'Kementerian Kesehatan Republik Indonesia', *Kementrian Kesehatan RI*, p. Available at: <https://www.kemkes.go.id/article/pri>.
- Kemenkes RI (2019) 'PEDOMAN NASIONAL PELAYANAN KEDOKTERAN TATA LAKSANA HIPERBILIRUBINEMIA'.
- Kemenkes RI (2023) 'Mengenal HIV dan AIDS serta Tanda-tanda Gejalanya', *Kementerian Kesehatan Republik Indonesia* [Preprint]. Available at: <https://ayosehat.kemkes.go.id/mengenal-hiv-dan-aids-serta-tanda-tanda-gejalanya>.
- Kemenkes RI (2025) 'Berani Tes, Berani Lindungi Diri, Kemenkes Targetkan Eliminasi HIV dan IMS Tahun 2030', *Kementerian Kesehatan Republik Indonesia* [Preprint]. Available at: <https://kemkes.go.id/id/berani-tes-berani-lindungi-diri-kemenkes-targetkan-eliminasi-hiv-dan-ims-tahun-2030>.
- Menteri Kesehatan Republik Indonesia (2022) 'Pedoman Nasional Pelayanan Kedokteran Tata Laksana Rinosinusitis Kronik', *Kemenkes RI*, pp. 1–106.



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- Menteri, P. *et al.* (2022) 'Peraturan Kementerian Kesehatan', (831).
- Murchu, E.O. *et al.* (2022) 'Oral pre-exposure prophylaxis (PrEP) to prevent HIV: A systematic review and meta-analysis of clinical effectiveness, safety, adherence and risk compensation in all populations', *BMJ Open*, 12(5). Available at: <https://doi.org/10.1136/bmjopen-2020-048478>.
- Orlando, S. *et al.* (2025) 'The global response to HIV/AIDS in sub-Saharan Africa: achievements, challenges, and perspectives for the future', *Frontiers in public health*, 13. Available at: <https://doi.org/10.3389/FPUBH.2025.1665666>.
- Patel, P. *et al.* (2022) 'Public Health Implications of Adapting HIV Pre-exposure Prophylaxis Programs for Virtual Service Delivery in the Context of the COVID-19 Pandemic: Systematic Review', *JMIR Public Health and Surveillance*, 8(6). Available at: <https://doi.org/10.2196/37479>.
- Pitchumoni, C.S. and Brun, A. (2024) 'HIV and AIDS', *Geriatric Gastroenterology*, pp. 659–666. Available at: https://doi.org/10.1007/978-1-4419-1623-5_71.
- Pitchumoni, C.S. and Brun, A. (2025) 'HIV and AIDS', *Geriatric Gastroenterology*, pp. 659–666. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK534860/>.
- Rutstein, S.E. *et al.* (2025) 'Multilevel Intervention to Support Tailored and Responsive HIV Pre-Exposure Prophylaxis Care in Rural North Carolina: Protocol for a Randomized Controlled Trial.', *JMIR research protocols*, 14, p. e68085. Available at: <https://doi.org/10.2196/68085>.
- Shen, J. *et al.* (2025) 'The reasons of late diagnosis in patients with HIV/AIDS: a Meta-synthesis', *Asian Nursing Research* [Preprint]. Available at: <https://doi.org/10.1016/j.anr.2025.10.005>.
- Wang, H. and Lu, X. (2025) 'Editorial: HIV/AIDS: pathogenesis and vaccine', *Frontiers in cellular and infection microbiology*, 15. Available at: <https://doi.org/10.3389/FCIMB.2025.1584301>.
- WHO (2025) 'HIV data and statistics', *World Health Organization* [Preprint]. Available at: <https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/hiv-strategic-information/hiv-data-and-statistics>.
- Wong, K. *et al.* (2020) 'Pathogenesis of Human Immunodeficiency Virus- Mycobacterium tuberculosis Co-Infection', *Journal of Clinical Medicine*, 9(3537), pp. 1–23.
- Zhang, H. *et al.* (2025) 'Targeting inflammasomes as a therapeutic potential for HIV/AIDS', *Cellular and molecular life sciences : CMLS*, 82(1). Available at: <https://doi.org/10.1007/S00018-025-05685-X>.