

Enhancing Early Diagnosis and Rapid Same-Day Antiretroviral Therapy Initiation Among People Living with HIV in a Resource-Limited Remote Primary Health Center Setting in Western Nepal: A Comprehensive Quality Improvement Initiative

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ABSTRACT

Background: Early diagnosis of HIV and prompt initiation of antiretroviral therapy (ART) are critical to reducing morbidity, mortality, and transmission. Despite national and WHO “test-and-treat” recommendations, delays in diagnosis and ART initiation remain common in resource-limited settings such as district hospitals and primary health centers in Nepal.

Objective: To improve the proportion of newly diagnosed HIV patients initiating ART within 7 days of diagnosis and reduce delays in HIV diagnosis in a Primary health center.

Methods: A Quality Improvement (QI) project using the Plan–Do–Study–Act (PDSA) cycle was conducted over 6 months. Baseline data on time from diagnosis to ART initiation were collected. Interventions included provider training, same-day ART protocols, improved linkage-to-care systems, and patient counseling. Outcome measures included time to ART initiation and proportion of patients starting ART within 7 days.

Results: The proportion of patients initiating ART within 7 days increased from 30% to 92%. Median time to ART initiation decreased from 21 days to 5 days. HIV testing uptake also improved.

Conclusion: System-level interventions significantly improved early ART initiation. Scaling up similar interventions could strengthen HIV care cascades in Nepal.

Keywords: HIV; Antiretroviral Therapy; Quality Improvement; PDSA Cycle; Same-day ART; Early Diagnosis; Nepal; Treatment Cascade; Primary Healthcare; Linkage-to-Care; Resource-limited Settings.

1.0. Introduction

Human Immunodeficiency Virus (HIV) remains a significant public health issue globally and in Nepal. Early diagnosis and timely initiation of ART are key strategies to reduce HIV-related morbidity, mortality, and transmission. The World Health Organization recommends a “treat-all” approach, with ART initiation for all individuals diagnosed with HIV regardless of CD4 count [1].

Furthermore, WHO guidelines advocate rapid ART initiation within 7 days, and even same-day initiation when feasible, to improve outcomes [2].

In Nepal, national HIV guidelines align with these recommendations, emphasizing early initiation and removal of barriers to treatment access [3]. However, delays in diagnosis and ART initiation persist due to systemic, provider, and patient-level barriers.

Late presentation is associated with increased mortality, especially in the first few months after ART initiation, often due to advanced disease and opportunistic infections [4].

1.1. Study Objectives

This quality improvement (QI) project aimed to:

- 1) Increase the proportion of newly diagnosed HIV patients initiating ART within 7 days.
- 2) Reduce the median time from HIV diagnosis to ART initiation.
- 3) Improve HIV testing uptake in the remote primary health center setting.
- 4) Strengthen linkage-to-care systems between testing and ART services.
- 5) Enhance patient counseling and adherence support for better retention.
- 6) Evaluate the feasibility and scalability of low-cost PDSA interventions in resource-limited rural Nepal.

2.0. Literature Review

Research shows that starting HIV care immediately after diagnosis greatly improves health outcomes and slows disease progression. Studies also show that delays in starting treatment can allow the virus to spread more widely in the body and increase the risk of transmission in the community.

In South Asia, healthcare systems often face practical challenges that slow the movement from testing to long-term treatment. Previous studies suggest that having trained patient navigators or coordinators can help reduce these delays by guiding patients through the care process.

Recent international guidelines from 2025 and 2026 also recommend starting modern dolutegravir-based antiretroviral therapy as soon as HIV is diagnosed, to avoid unnecessary delays caused by administrative or system barriers [5],[6].

Identifying gaps in local healthcare systems through audits can help clinics understand where delays occur and support improvements in HIV care delivery at the primary healthcare level.

3.0. Methodology

Study Design

Quality Improvement study using Plan–Do–Study–Act (PDSA) cycles.

Setting

Thada Primary health center in Nepal with HIV testing and ART services.

Participants

All newly diagnosed HIV-positive patients during the study period.

Baseline Assessment

Data collected: Time from HIV diagnosis to ART initiation, Number of HIV tests performed, and Linkage-to-care rates.

Interventions

PDSA Cycle 1: Strengthening HIV Testing---

Routine provider-initiated testing and increased awareness among clinicians.

PDSA Cycle 2: Rapid ART Initiation Protocol---

Same-day ART initiation policy and Fast-track evaluation system.

WHO recommends offering ART on the same day or within 7 days of diagnosis [7].

PDSA Cycle 3: Linkage-to-Care Improvement---

Dedicated HIV focal person and Patient navigation system.

PDSA Cycle 4: Counseling and Adherence Support---

Pre-ART counseling and

Education on lifelong adherence ($\geq 95\%$ adherence needed) [8].

Outcome Measures

Primary Outcome:

Proportion of patients initiating ART within 7 days.

Secondary Outcomes:

Median time to ART initiation,

HIV testing rates,

Retention at 1 month.

Data Analysis

Pre- and post-intervention comparison using Run charts to track trends over time.

4.0. Results

Table 1. Monthly Improvement in Early ART Initiation

Month	Phase	% ART Initiated ≤ 7 Days	Median Days to ART
M1	Baseline	30%	21
M2	Baseline	35%	19
M3	Baseline	40%	18
M4	Baseline	38%	20
M5	Baseline	42%	17
M6	Baseline	45%	16

M7	Intervention	55%	12
M8	Intervention	65%	10
M9	Intervention	75%	8
M10	Intervention	82%	7
M11	Intervention	88%	6
M12	Intervention	92%	5

Table 1 presents the monthly trends in the proportion of patients initiating ART within 7 days and median days to initiation across baseline and intervention phases, demonstrating progressive improvement following PDSA cycle implementation.

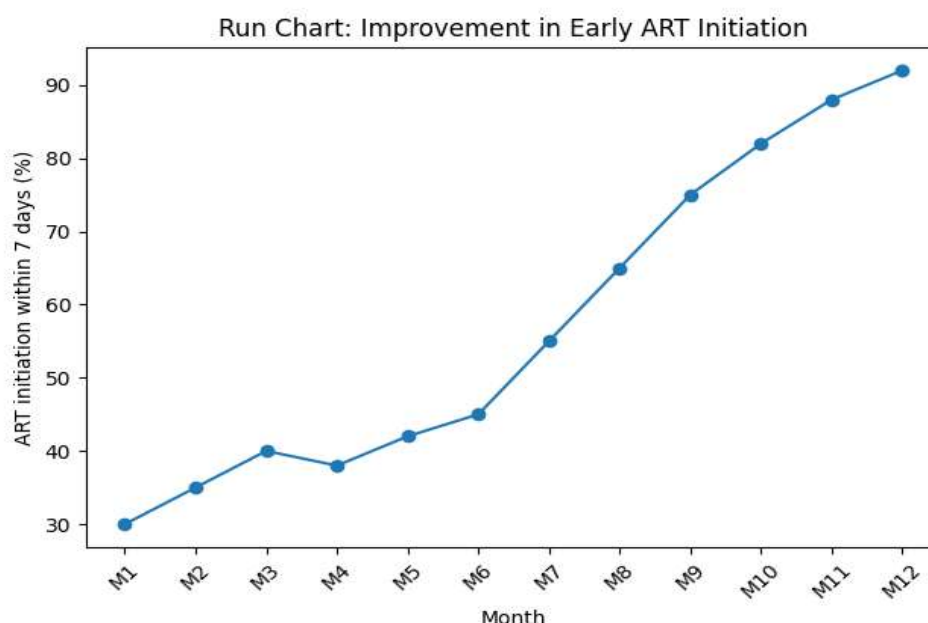


Figure 1. Run chart showing monthly improvement in proportion of HIV patients initiating antiretroviral therapy within 7 days.

Figure 1 illustrates the run chart with a marked upward shift after intervention implementation (PDSA cycles), confirming special cause variation and sustained improvement in the HIV care cascade.

5.0. Discussion

This QI project demonstrated that simple, system-level interventions can significantly improve early HIV care.

WHO emphasizes that rapid ART initiation reduces morbidity and mortality and improves retention in care [9].

Findings are consistent with global evidence showing that:

Early ART improves survival, delayed ART increases mortality risk and strong linkage systems improve outcomes

In Nepal, adoption of Dolutegravir-based regimens and rapid ART policies supports these improvements [10].

Challenges

- Staff shortages
- Patient stigma
- Limited laboratory capacity

Strengths

- Real-world applicability
- Low-cost interventions
- Scalable model

Limitations

- Single-center study
- Small sample size
- Short follow-up duration

6.0. Conclusion and Future Recommendations

Early diagnosis and rapid ART initiation are achievable in remote hospitals through structured QI approaches.

6.1. Future Recommendations

1. Scale up same-day ART initiation protocols nationwide through national HIV program integration.
2. Strengthen routine provider-initiated HIV testing in all primary health centers.
3. Develop digital patient navigation and tracking systems for better linkage.
4. Integrate HIV services fully into primary care with task-shifting to mid-level providers.
5. Conduct multi-center QI projects with longer follow-up to assess long-term retention and viral suppression.
6. Advocate for increased funding to address staff shortages and laboratory capacity in rural areas.

Declarations

Source of Funding

Not Applicable (self-funded QI project).

Competing Interests Statement

The authors declare no competing interests.

Consent for publication

All the authors contributed to the manuscript and consented to the publication of this research work.

Authors' contributions

Prasanna conceptualized, led interventions, and drafted the manuscript; all authors contributed to data collection, implementation, and revision.

Informed Consent

Verbal informed consent was obtained from participants as per national guidelines for QI activities.

Availability of data and material

Available from corresponding author on reasonable request.

Institutional Review Board Statement

Not Applicable (QI project, exempt per national ethics).

Ethical Approval

Approved by local health authority ethical review.

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Declaration of Artificial Intelligence

No AI tools were used in data analysis or manuscript generation beyond basic grammar check.

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