Effectiveness of Differentiated Service Delivery ART Care Among Priority Populations in Sub-Saharan Africa: Evidence from a Systematic Review and Meta-analysis

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Correction and Editorial Note (Version 2 — 10 July 2026)

This version is a truth-first rebuild of the original advanced draft, which contained placeholder PRISMA counts, a fabricated per-model subgroup table, an unsourced patient-satisfaction estimate, and several citations whose coordinates pointed to unrelated papers. It is re-anchored on two PubMed-verified RCT-only meta-analyses (Bwire 2023; Nega 2026). The evidence base is corrected from “predominantly observational (VERY LOW)” to randomised (viral-suppression certainty HIGH; retention MODERATE), and genuine model-level heterogeneity (I^2 up to 90% within single models) is restored in place of the original's fabricated uniform low heterogeneity. Findings: DSD preserves viral suppression (RR 1.01, 95% CI 1.00–1.02) and improves retention (RR 1.09; ~7 percentage points).

This corrected and expanded Version 2 supersedes Version 1, which remains available in this article's version history. Every quantitative claim is regenerated by a deterministic companion verification script, and every retained reference PMID was re-verified against PubMed metadata.

Abstract

Background. Differentiated service delivery (DSD) for antiretroviral therapy (ART) tailors care intensity to clinically stable patients — community ART groups, adherence clubs, multi-month dispensing, and community pickup points. We synthesise the strongest available evidence (randomised trials) on whether DSD preserves viral suppression and improves retention versus standard facility care.

Methods. Truth-first synthesis anchored on two independent RCT-only meta-analyses in sub-Saharan Africa: Bwire 2023 (16 RCTs, 13,886 participants) and Nega 2026. Estimates are taken verbatim from the published reports and cross-checked by a deterministic script that (i) tests non-inferiority against a 0.95 margin, (ii) re-expresses Nega's non-suppression estimate on the suppression side to test concordance with Bwire (without pooling overlapping trials), and (iii) frames the verified retention benefit in absolute terms with a stated baseline. GRADE for RCT evidence.

Results. Across 16 RCTs, any DSD model versus standard care gave **viral suppression RR 1.01 (95% CI 1.00–1.02, I^2=0%)** and **retention RR 1.09 (1.08–1.11, I^2=0%)** (Bwire 2023). The independent Nega 2026 MA concurred: viral non-suppression RR 0.89 (0.74–1.07) — implying a suppression-side RR ≈1.01–1.02 across plausible baselines. Non-inferiority on suppression is met (lower CI ≥0.95). The retention benefit corresponds to an absolute gain of ~7 percentage points (NNT ≈14 at 80% baseline). Crucially, heterogeneity is **model- and setting-dependent**: single-model pools reach I^2=77–84% (adherence clubs; Bwire) and I^2=90% (non-retention; Nega), so the tight any-DSD pool must not be read as uniformity.

Conclusion. RCT evidence supports DSD scale-up for stable ART patients: viral suppression is preserved and retention improves on average. But the benefit is not uniform across models or settings, and program-level results can vary widely — a nuance the original draft's fabricated low-heterogeneity table obscured.

1. Introduction

DSD was developed on the premise that stable, virologically-suppressed patients do not need the clinical contact intensity of newly-initiated or unstable patients. Conventional ART imposes monthly/quarterly facility

visits with substantial transport cost, lost income, and disclosure risk. Four models operate at scale: community ART groups (CAG), adherence clubs, multi-month dispensing (MMS), and community drug distribution points (CDDP). The policy question is whether reduced facility contact preserves clinical outcomes. This synthesis answers it from randomised evidence — the appropriate tier, and (contrary to the v1 draft's assumption) the tier that actually exists for this question.

2. Methods

Design. Truth-first evidence synthesis. Because two RCT-only meta-analyses now exist, we anchor on them rather than re-extract primary trials (which risks introducing the very citation errors that plagued v1). Both were verified against PubMed metadata:

• **Bwire 2023** (*Rev Med Virol* 33(6):e2479; PMID 37655428; PROSPERO

CRD42023418988): 1,596 records screened → **16 RCTs, 13,886 participants**, adults and children, sub-Saharan Africa; random-effects RRs.

• **Nega 2026** (*AIDS Res Ther* 23(1):21; PMID 41582132): independent RCT-only MA

of stable PLWH in Africa; Cochrane RoB 2; Cochran Q / forest-plot heterogeneity.

Analysis (companion script). (1) Non-inferiority of viral suppression against a prespecified RR margin of 0.95. (2) Cross-MA concordance: Nega reports *non-* suppression, so we re-express it on the suppression side across a baseline sensitivity band (8–16% non-suppression) and compare with Bwire — **without pooling** the two MAs, since they share included trials and pooling would double-count. (3) Absolute retention benefit (NNT) at stated baselines. GRADE for RCT evidence (start HIGH; downgrade for heterogeneity, indirectness, imprecision as warranted).

3. Results

3.1 Viral suppression: non-inferior, concordant across two MAs

Any DSD model versus standard care preserved viral suppression: **RR 1.01 (95% CI 1.00–1.02), I²=0%** across 16 RCTs (Bwire 2023). The lower confidence bound (1.00) exceeds the 0.95 non-inferiority margin and touches the line of equivalence, so DSD is at least non-inferior, with a point estimate marginally favouring DSD.

The independent Nega 2026 MA corroborates this. It reports viral **non**-suppression RR 0.89 (0.74–1.07); re-expressed on the suppression side across plausible baseline non-suppression risks (8%, 12%, 16%), the implied suppression RR is **1.01–1.02** (companion script) — directly concordant with Bwire. Two independently conducted RCT-only meta-analyses thus agree that DSD does not compromise viral suppression. (Because their trial sets overlap, this is reported as corroboration, not a pooled super-estimate.)

3.2 Retention: better on average, ~7 points absolute

Any DSD model improved retention in care: **RR 1.09 (95% CI 1.08–1.11), I²=0%** (Bwire 2023). Framed absolutely (companion script): against a standard-care 12-month retention of 80%, DSD retention is ~87% — an absolute gain of **7.2 percentage points, NNT ≈14** to keep one additional patient in care per year; the gain is 6.8pp (NNT 15) at a 75% baseline and 7.7pp (NNT 13) at 85%. Over a multi-year programme horizon this compounds into materially fewer patients lost to follow-up.

3.3 Heterogeneity is real and model-dependent (the v1's key distortion)

The tight any-DSD pools (I²=0%) must not be mistaken for uniformity. When Bwire restricts to a *single* model — adherence clubs — heterogeneity is high: retention RR 1.01 (0.96–1.07, **I²=84%**) and suppression RR 1.02 (0.98–1.07, **I²=77%**). Nega's non-retention pool reaches **I²=90%** with a CI of 0.68–1.57 that spans both substantial benefit and substantial harm. The honest reading: the *average* DSD effect is favourable and

precisely estimated, but *which* model in *which* setting delivers that average varies widely. The v1 draft's fabricated per-model table (CAG 1.00, MMS 1.03, CDDP 1.02, FFT 1.00, all "I²=14%") invented a false uniformity; it is removed.

3.4 GRADE

Outcome	Certainty	Rationale
Viral suppression (non-inferiority)	**HIGH**	16 RCTs, I²=0% for any-DSD pool, concordant across two MAs, direct outcome
Retention in care	**MODERATE**	RCT evidence, large tight any-DSD effect; downgraded once for **model-level heterogeneity** (single-model I² up to 90%)
Patient satisfaction	**not assessed**	v1's SMD 0.42 had no verifiable source; **removed** rather than reported

This is a substantive re-grading: the v1 started from "predominantly observational → VERY LOW/MODERATE." The evidence is in fact RCT-based, so suppression reaches HIGH certainty. Retention is held at MODERATE by genuine between-model heterogeneity, not by observational bias.

4. Discussion

The randomised evidence delivers a clear, defensible message: for clinically stable patients, DSD preserves viral suppression (HIGH certainty, two concordant RCT MAs) and improves retention (MODERATE certainty, ~7 absolute points). The mechanism is plausible — fewer facility visits lower the opportunity cost of staying in care — and the direction is consistent across model families.

The important refinement over the original draft is honesty about heterogeneity. "DSD works on average" and "every DSD model works everywhere" are different claims; only the first is supported. Single-model pools with I² near 80–90% mean that a programme adopting one model in one health system cannot assume the pooled average will reproduce locally. This argues for **local monitoring of retention and suppression during scale-up**, not blanket extrapolation — precisely the implementation-science posture the DSD field has adopted. Head-to-head randomised comparisons *between* DSD models remain scarce and are the key evidence gap.

5. Limitations

Both anchor MAs pool trials of differing models, durations, and populations (adults and children), so their any-DSD estimates average over real clinical heterogeneity. The two MAs share included trials, so they are treated as corroborating, not independent, and are not pooled. Retention definitions and ascertainment differ across trials, and active follow-up in some DSD models could inflate measured retention relative to passive standard-care follow-up. The absolute NNT depends on the assumed baseline retention, which is stated explicitly and varied. Patient-satisfaction and per-model effects claimed in v1 are not reported here because no verifiable source underpins them.

6. Conclusion

Randomised evidence supports DSD scale-up for stable ART patients: viral suppression is preserved (RR 1.01, 95% CI 1.00–1.02, I²=0%; concordant across two RCT-only MAs) and retention improves (RR 1.09, 1.08–1.11; ~7 absolute points, NNT ≈14). The benefit is real but model- and setting-dependent (single-model I² up to 90%), so scale-up should be paired with local outcome monitoring rather than assumed uniform.

7. References (PMIDs verified against PubMed on 2026-07-09)

1. Bwire GM, Njiro BJ, Ndumwa HP, et al. Impact of differentiated service delivery models on retention in HIV care and viral suppression among people living with HIV in sub-Saharan Africa: a systematic review and meta-analysis of randomised controlled trials. *Rev Med Virol.* 2023;33(6):e2479. **PMID 37655428.**

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3. Grimsrud A, Bygrave H, Doherty M, et al. Reimagining HIV service delivery: the role of differentiated care from prevention to suppression. *J Int AIDS Soc.* 2016;19(1):21484. **PMID 27914186.**

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5. Guyatt GH, Oxman AD, Schünemann HJ, Tugwell P, Knottnerus A. GRADE guidelines: a new series of articles in the Journal of Clinical Epidemiology. *J Clin Epidemiol.* 2011;64(4):380-382. **PMID 21185693.**

6. World Health Organization. *Consolidated Guidelines on HIV Prevention, Testing, Treatment, Service Delivery and Monitoring.* Geneva: WHO; 2021. (DSD service-delivery recommendations.)

Removed from v1 (reproduce-or-remove): the placeholder PRISMA counts and the fabricated per-model subgroup table (no study data); the patient-satisfaction SMD 0.42 (no verifiable source); and citations whose stated coordinates point to unrelated papers — v1 refs for Pasipamire (24:e25665 = a men's HIV-testing RCT), Cassidy (23:e25474 = an adolescent viral-load cohort), Wilkinson (24:e25730 = a drug-users policy essay), Decroo, Mukumbang, Geng, and Ehrenkranz — which could not be reliably re-anchored and are dropped in favour of the verified MAs above.