

Describing Engagement in the HIV Care Cascade: A Methodological Study

Diya Jhuti^{1,2}, Gohar Zakaryan¹, Hussein El-Kechen³, Nadia Rehman³, Mark Youssef⁴, Cristian Garcia⁴, Vaibhav Arora¹, Babalwa Zani⁵, Alvin Leenus⁶, Michael Wu⁷, Oluwatoni Makanjuola⁸, Lawrence Mbuagbaw^{3,9-11}

¹Faculty of Health Sciences, McMaster University, Hamilton, ON, Canada; ²Department of Health, Behavior, and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA; ³Department of Health Research Methods, Evidence and Impact, McMaster University, Hamilton, ON, Canada; ⁴Faculty of Medicine, University of Toronto, Toronto, ON, Canada; ⁵Public Health Research Unit, AB Consulting, Cape Town, South Africa; ⁶Faculty of Law, University of Ottawa, Ottawa, ON, Canada; ⁷Michael DeGroote School of Medicine, McMaster University, Hamilton, ON, Canada; ⁸Faculty of Science, McMaster University, Hamilton, ON, Canada; ⁹Biostatistics Unit, Father Sean O'Sullivan Research Centre, Hamilton, ON, Canada; ¹⁰Centre for Development of Best Practices in Health, Yaoundé Central Hospital, Yaoundé, Cameroon; ¹¹Department of Global Health, Stellenbosch University, Cape Town, South Africa

Correspondence: Lawrence Mbuagbaw, Biostatistics Unit/FSORC, 50 Charlton Avenue East, St Joseph's Healthcare—Hamilton, 3rd Floor Martha Wing, Room H321, Hamilton, ON, L8N 4A6, Canada, Tel +1-905-522-1155 ext 35929, Fax +1-905-528-7386, Email mbuagblc@mcmaster.ca

Introduction: Engagement in the HIV care cascade is required for people living with HIV (PLWH) to achieve an undetectable viral load. However, varying definitions of engagement exist, contributing to heterogeneity in research regarding how many individuals are actively participating and benefitting from care. A standardized definition is needed to enhance comparability and pooling of data from engagement studies.

Objectives: The objective of this paper was to describe the various definitions for engagement used in HIV clinical trials.

Methods: Articles were retrieved from CASCADE, a database of 298 clinical trials conducted to improve the HIV care cascade (<https://hivcarecascade.com/>), curated by income level, vulnerable population, who delivered the intervention, the setting in which it was delivered, the intervention type, and the level of pragmatism of the intervention. Studies with engagement listed as an outcome were selected from this database.

Results: 13 studies were eligible, of which five did not provide an explicit definition for engagement. The remaining studies used one or more of the following: appointment adherence (n=6), laboratory testing (n=2), adherence to antiretroviral therapy (n=2), time specification (n=5), intervention adherence (n=5), and quality of interaction (n=1).

Conclusion: This paper highlights the existing diversity in definitions for engagement in the HIV care cascade and categorize these definitions into appointment adherence, laboratory testing, adherence to antiretroviral therapy, time specification, intervention adherence, and quality of interaction. We recommend consensus on how to describe and measure engagement.

Keywords: HIV, engagement, antiretroviral therapy, adherence, retention, cascade

Background

To curb the HIV epidemic, UNAIDS committed to helping countries and regions meet the 90–90–90 targets.¹ By 2020, UNAIDS aimed for 90% of people living with HIV (PLWH) to know their HIV status, for 90% of those diagnosed HIV-positive to receive antiretroviral therapy (ART), and for 90% of patients receiving ART to be in viral suppression.¹ However, by 2020, only 73% of the 37.7 million people globally living with HIV have access to ART, only 79% of PLWH know their HIV status, and 20% of PLWH have yet to receive ART.²

Barriers to testing, staying in care, and starting or adhering to antiretroviral treatment exist and contribute to the loss of individuals at different stages of the HIV care cascade, preventing the fulfillment of the 90–90–90 targets.¹ As such, only a proportion of people living with HIV are engaged with all the steps required to achieve an undetectable viral load.³ Furthermore, according to UNAIDS, despite 79% of PLWH knowing their status, more than 20% of people diagnosed

had not yet initiated treatment in 2018.² This is a concerning proportion because it shows that there are barriers to engagement in care that prevent PLWH from achieving optimal outcomes.²

A significant challenge in assessing the efficacy of public health programs and achieving the now expanded 95–95–95 targets is the lack of a standardized definition for engagement in care among PLWH.⁴ Varying definitions of engagement exist, which contributes to heterogeneity in research regarding how many individuals are actively participating and benefitting from HIV care.³ The overestimation of disengagement or the oversimplification of the complex cycle of entry and re-entry into care contribute to the misclassifications of engagement.^{4–9} The implications of misclassifying engagement include failing to detect immunosuppression, inaccurately prioritizing interventions targeting viral suppression and retention in care, and failing to recognize disengagement from individuals who remain at a care facility.¹⁰ Furthermore, engagement often implies a moral framework of what constitutes a “good” patient compared to a “bad” patient.¹¹ Misunderstandings regarding engagement and a lack of agreement on what qualifies a patient as “engaged” in HIV care can contribute to bias in providers, which can be an additional barrier to care.

A lack of a standard definition of engagement precludes comparison of findings across studies and compromises researchers’ ability to pool data. Thus, defining engagement in care has the potential to reduce barriers to engagement, including inaccurate assessments of engagement, incorrect prioritization of interventions, and bias associated with “good” and “bad” patients. Furthermore, engagement requires more than a single measure, making it essential to evaluate each element included in the definitions of engagement found in the literature.^{12–15} The objective of this methodological study was to identify and describe the various definitions for engagement in care used in HIV clinical trials.

Methods

We conducted a methodological study of randomized controlled trials (RCTs) with engagement as one of their outcomes. Studies were drawn from the database CASCADE (<https://hivcarecascade.com/>). CASCADE is a repository of clinical trials of interventions to improve the HIV care cascade, which includes trials aimed at investigating diagnosis and initiation of treatment, adherence to antiretroviral therapy, and retention in care.^{1–4,16} These clinical trials have been curated by income level, vulnerable population, who delivered the intervention, the setting in which it was delivered, the intervention type, and the level of pragmatism of the intervention. The search strategies and data management used to build the database are reported elsewhere but include searches of multiple electronic databases and duplicate data extraction.¹⁷ CASCADE, as a result of a comprehensive search of PubMed, Excerpta Medica dataBASE, Cumulative Index to Nursing and Allied Health Literature, PsycINFO, Web of Science and the Cochrane Library, includes 298 trials published between 1995 and 2021.

Using the advanced search filter, we identified trials in which engagement was listed as an outcome. The identified trials were further categorized into those that explicitly defined engagement and those that did not. Explicit definitions of engagement were identified through specifications such as, “Engagement in care was defined as...” Those that did mention an explicit definition were further sorted into 6 categories (appointment adherence, laboratory testing, ART adherence, time period specification, intervention adherence, and quality of interaction) by two authors based on the content of the definitions. Trials that had multiple definitions of engagement were also included in these 6 categories.

Results

Of the 298 studies in the database, 13 studies were eligible, of which five did not provide any explicit definition for engagement. The remaining 8 defined engagement using: appointment adherence (n=6), laboratory testing (n=2), ART adherence (n=2), time period specification (n=5), intervention adherence (n=5), and quality of interaction (n=1). A flow chart of the included studies is shown in Figure 1 and the characteristics of the study are shown in Table 1.

Of the 8 studies with explicit definitions of engagement, six defined engagement in care as appointment adherence, which was the most common definition.^{18–23} Five studies specified periods during which the appointments must occur for patients to be considered engaged. However, the frequency of visits and time period in the patient’s medical history that were examined differed greatly. One study examined appointment adherence over a period of 3 months;²⁰ two examined adherence over a period of 6 months;^{18,21} and another study examined adherence over a period of 12 months.¹⁹ One study

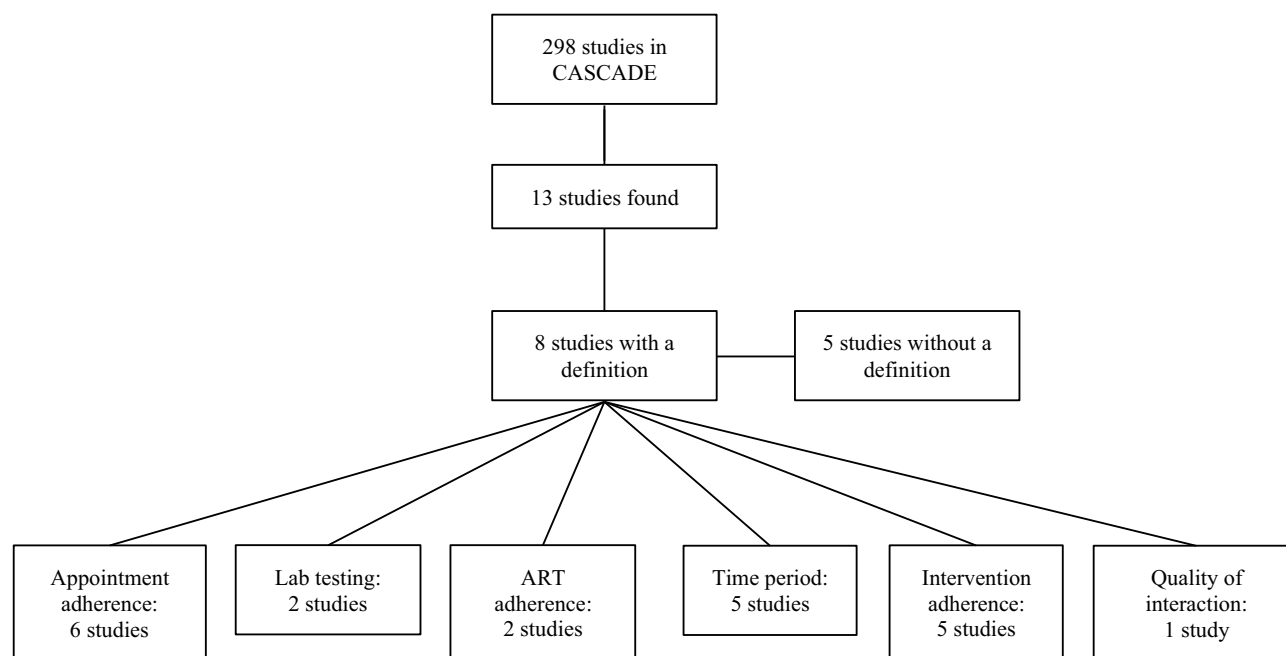


Figure 1 Flowchart detailing the data screening and extraction process from the CASCADE database.

examined appointment adherence by identifying if appointments were scheduled and attended within 60 days of each other.²² One study did not specify a time frame.²³

Two studies included laboratory testing in their definitions of engagement.^{24,25} These studies either measured the frequency of viral load tests or CD4 counts during clinic visits or whether ≥ 1 laboratory test results were recorded within the past 12 months.^{24,25}

Two studies used ART adherence either as the whole definition of engagement or as a component that was included in the definition.^{22,24} Another study identified engagement based on how often participants included the intervention being tested in their daily lives.²⁶ The remaining studies had no explicit definition for engagement in HIV care.^{27–30}

The most comprehensive definitions of engagement in the literature were studies that included four of the elements described in Figure 2. One study considered engagement to be a combination of appointment adherence, lab testing, ART adherence, and self-reported engagement measures.²⁴ A second study considered engagement to be a combination of appointment adherence, ART adherence, within a specific period, and self-reported engagement measures (ART adherence).²²

Discussion

We identified 8 randomized trials using diverse definitions of engagement including appointment adherence, laboratory testing, ART adherence, time period specification, intervention adherence, and quality of interaction with the health care provider.

At first glance, appointment adherence seems to be an ideal measure of engagement; it is easy to measure, offers a more quantitative measure of engagement, and from a clinician and research standpoint, it offers little room for bias since it is not self-reported.¹⁴ There has also been evidence of a strong dose-response relationship between clinic visits and reduced mortality, suggesting that identifying and measuring clinic visits as a form of engagement in care may be valuable.³¹ However, there are other important considerations.

Appointment adherence is a complex measure as it can also be further categorized according to the number of missed visits or the length of time between visits. Missed visits are easy to measure, but require that visits be scheduled.¹⁴ The length of time between visits is also easy to measure and can be used to accurately estimate and determine loss to follow-up.¹⁴ However, the number of visits or length of time that is considered as disengagement is highly variable.¹⁴ When

Table I Characteristics of the Studies Found from the CASCADE Database

Article	Country	Sample Size	Study Intervention	Intervention Category*	Who Delivered the Intervention**	Setting of the Intervention	Target Population	Duration of Follow-Up (Months)	Number of Trial Sites
Ayer et al 2021 ²⁷	Nepal	468	Nurse-led mobile phone voice call reminder	Mobile Health	Clinicians	Clinic-based	HIV-positive individuals	6	7
Kalichman et al 2021 ¹⁸	USA	251	Behavioral self-regulation counseling delivered by telephone or in-office sessions	Mobile health, counselling	Clinicians	Clinic-based	Individuals receiving HIV care	12	1
Carey et al 2019 ²⁶	USA	42	Telephone-delivered mindfulness training	Mobile health	Laypersons	Clinic-based	Individuals infected with HIV and sub-optimally adherent to ART	3	1
Stephenson et al 2021 ²⁴	USA	318	Three-session dyadic intervention involving HIV testing and adherence counseling	Counselling	Laypersons	Clinic-based	Serodiscordant male couples	18	3
Kuo et al 2019 ²¹	USA	110	Computerized counseling session and post-incarceration text messaging intervention	Electronic, counselling	Clinicians	Other (remote)	Recently incarcerated individuals infected with HIV	6	1
Hosek et al 2018 ²⁰	USA	103	Gender-specific, group-based intervention	Counselling	Clinicians, peers	Clinic-based	Youth diagnosed with HIV within the past 12 months	12	4
Sikkema et al 2018 ²²	South Africa	64	Three adherence counseling sessions and four individual and group sessions specific for HIV-infected women with sexual abuse histories	Counselling	Laypersons	Clinic-based	Women infected with HIV newly initiating ART	6	1
Towe et al 2019 ²⁵	USA	236	Rapid re-housing intervention	Other	Laypersons	Community-based	Low-income, homeless people living with HIV/AIDS residing in HIV emergency housing in NYC	12	22
Chander et al 2015 ¹⁹	USA	148	Brief alcohol intervention among hazardous drinking women receiving care	Counselling	Laypersons	Clinic-based	Hazardous drinking women receiving care in an urban, HIV clinic	12	1

Chang et al 2018 ²³	Uganda	442	Peer support using the Information, Motivation, and Behavioral Skills (sIMB) conceptual framework	Peer navigation or support	Peers	Other (research institution)	Adults infected with HIV who had received recently received HIV Counseling and Testing	12	1
Lechner et al 2002 ²⁸	USA	330	Cognitive behavioral stress management/ expressive supportive therapy intervention (CBSM+) and a time-matched individual psychoeducational condition	Psychotherapy	Clinicians	Community and clinic-based	Adult women with AIDS	1	3
Richter et al 2014 ²⁹	USA	544	Women living with HIV as peer mentors supporting pregnant women living with HIV	Peer navigation or support	Peers	Clinic-based	Pregnant and non-pregnant women living with HIV	1.5	8
Sorensen et al 2003 ³⁰	USA	190	12 months of case management delivered by paraprofessionals	Other	Laypersons	Clinic-based	Substance-abusing patients with HIV/AIDS	18	1

Notes: *Types of intervention categories are defined as: Education: flyers, text, sessions; Mobile health: phone calls, text messages, app-based; Counselling: group or one on one sessions; Electronic: computer-based, interactive; Changes in health care delivery: change in the number of pills, place where medication is delivered, dedicated staff or space etc.; Incentives: food, money, vouchers; Peer navigation or support: another person with HIV helping; Psychotherapy: cognitive behavioural therapy, motivational interviewing; Outreach: going to meet/find people in their communities; Other: an intervention that does not fit in any of the above categories. This definition was extracted from hivcarecascade.com/. **Who delivered the intervention category is defined as: Clinicians: nurses, doctors, other professional health staff; Peers: other people living with HIV; Laypersons: volunteers, community health workers etc. This definition was extracted from hivcarecascade.com/.

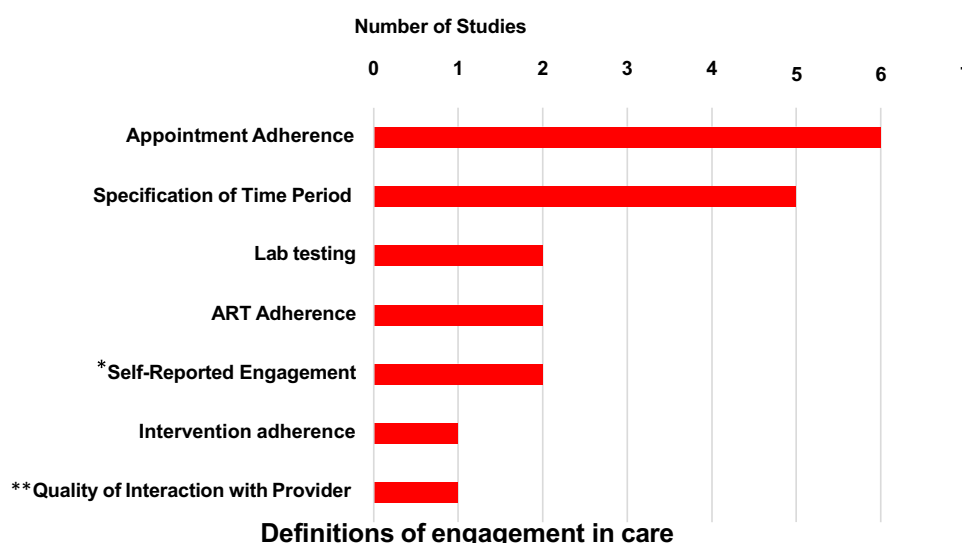


Figure 2 Definitions of engagement in each clinical trial. This bar graph summarizes definitions engagement versus the number of studies in which those definitions were used. *Self-reported measures included ART adherence, clinic attendance, viral testing frequency. **Quality of interaction with provider was examined using a 13-item questionnaire to rate patient interactions with their healthcare provider on a 4-point Likert scale.

estimating appointment adherence, the number of visits required may vary based on patient needs and acuity,¹⁴ suggesting that the number of visits alone may be insufficient in capturing engagement. A more nuanced definition incorporating barriers to care, including stigma, accessibility concerns, distance to providers, and health literacy and knowledge is warranted.^{18,19} Comparability between studies using appointment adherence is also limited due to variations in study protocols, methodologies, and appointment lengths and frequency.

The specification of a time frame in which to examine engagement standardizes how long patients have until they are considered disengaged. Despite this being the second most frequently reported definition, there is a lack of literature to support a suggested time period in which to measure whether a patient is engaged or not after diagnosis. In the studies examined in this paper, the time period specified ranged from the past 3 months to 12 months. Therefore, it seems that measuring engagement within the past year is an appropriate time period. However, it is important to note that people living with HIV may have different needs that are relevant at various time points. For example, the clinical visits may not overlap with the lab visits or visits for psychosocial support. Further, within the context of research, for reasons of feasibility or availability of resources, engagement may only be captured for brief periods.

Using the frequency of lab testing as a measure for engagement is objective and does not require patient interviews. One prospective, observational, cohort study (n=2909) examined HIV laboratory testing events as a proxy for engagement in care by analyzing laboratory tests associated with medical encounters.³² They concluded that laboratory testing had a high positive predictive value for actual engagement, which was defined as having at least 2 medical encounters within 12 months that were at least 90 days apart.³² This measure is not without its limitations. It requires that testing be available and accessible. However, because lab testing is associated with active engagement in care, it can be prioritized as an essential part of engagement.

ART is rarely considered the sole aspect of the definition for engagement, as there are several barriers to ART adherence, including patient-provider trust, systemic stigma and discrimination, and a lack of social support.³³ Furthermore, using ART adherence as a definition for engagement blurs the lines between engagement in care and adherence to treatment. Yet, adherence to medication is a critical part of engagement and is highly correlated with viral suppression.³⁴ Another study found that participants that were prescribed ART medications were more likely to attend scheduled visits, suggesting a relationship between ART adherence and other forms of engagement in care.³⁵

Only one study recommended adherence to the RCT intervention as a measure for engagement. Adherence to a new or foreign intervention in care may not be an accurate reflection of an individual's engagement in care. This is because implementing a new intervention in their care involves new factors and different barriers; for instance, if the intervention

was a novel engagement strategy through telephone reminders, and a patient rarely uses their cell phone or has limited use due to work, failure to engage with this intervention may not mean that the patient is not engaged in care. This definition may only have value in research settings or for evaluating the feasibility of a program.

Self-reported engagement has several advantages, as it encompasses all the components to consider regarding measures of engagement, including stigma, access to clinics or labs, health literacy, etc., because it can individualize engagement through self-reflection. However, in theory, self-reported engagement allows for recall bias, social desirability bias and is difficult to standardize. There can be efforts to mitigate this bias. One study in the UK found that there was a high level of accuracy of self-reported lab testing, as only 16% of PLWHIV did not correctly self-report whether their viral load was undetectable and 25% did not correctly self-report their CD4 count.³⁶ Another study found that asking participants on what days they had taken their ART, compared to what days they missed their ART, was more accurate.³⁷ Furthermore, in examining recall bias, one-month recall was comparable with 3-day recall, suggesting that one month can be a valid recall timeframe.³⁷ However, inaccurate self-reporting was associated with sexual orientation, non-white ethnicity, lower socioeconomic status, poor English fluency, lack of a support network, and nondisclosure of HIV status.³⁶ As such, self-reporting is highly susceptible to being impacted by systemic and individual barriers.

Literature supports that the quality of patient-provider interactions affects patient engagement in care, especially regarding provider qualities such as empathy and effective communication.³⁸ This measure of engagement acknowledges that frequency may not be superior to quality. In one qualitative study, provider competence was a barrier to engagement, especially for men as many male providers assumed that their male clients had sex with women only.³³ Additionally, this measure can act as a predictor of other measures of engagement. One study found that patients who felt that their providers always listened carefully to them kept 7% more of their appointments than patients who felt that their providers usually, sometimes, or never listened to them carefully.³⁸ While there is no standard way of measuring the quality of interaction with a provider, the quality of patient-provider interactions may lead to increased appointment adherence, lab testing, and ART adherence.

Strengths and Limitations

This study was done to provide an overview of definitions of engagement in HIV intervention research. To our knowledge, this is the first study summarizing the nuances of engagement in HIV care. Additionally, this study highlights the benefits of using CASCADE, a database of curated clinical trials investigating the HIV care cascade. Using such a selective database allowed this study to exclusively examine high-quality evidence-based research. One key limitation of this work is that we focused solely on randomized trials. Other study designs may have useful definitions of engagement that were not considered here.

Conclusion

Randomized trials assessing the safety and efficacy of HIV interventions define engagement in care in various ways, making it challenging to compare findings across studies. We recommend future work aimed at establishing a unified definition for engagement in HIV care.

Ethics Statement

There were no participants involved at any stage of this research; ethical approval was not required for this study. The authors do not have any conflicts of interest to disclose. Other sources used to contribute to this paper have been cited. No funding was used for this research.

Author Contributions

All authors contributed to data analysis, drafting or revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

References

1. UNAIDS. 90-90-90: an ambitious treatment target to help end the AIDS epidemic; 2014. Available from: https://www.unaids.org/sites/default/files/media_asset/90-90-90_en.pdf. Accessed April 26, 2023.
2. UNAIDS. Global AIDS update 2019 — communities at the centre; 2019. Available from: https://www.unaids.org/sites/default/files/media_asset/2019-global-AIDS-update_en.pdf. Accessed April 26, 2023.
3. UNAIDS. Global HIV & AIDS statistics — fact sheet; 2021. Available from: <https://www.unaids.org/en/resources/fact-sheet>. Accessed April 26, 2023.
4. Ehrenkranz P, Rosen S, Boule A, et al. The revolving door of HIV care: revising the service delivery cascade to achieve the UNAIDS 95-95-95 goals. *PLoS Med*. 2021;18(5):e1003651. doi:10.1371/journal.pmed.1003651
5. Chammartin F, Zürcher K, Keiser O, et al. Outcomes of patients lost to follow-up in African antiretroviral therapy programs: individual patient data meta-analysis. *Clin Infect Dis*. 2018;67(11):1643–1652. doi:10.1093/cid/ciy347
6. Etoori D, Gomez-Olive FX, Reniers G, et al. Outcomes after being lost to follow-up differ for pregnant and postpartum women when compared with the general HIV treatment population in Rural South Africa. *J Acquir Immune Defic Syndr*. 2020;85(2):127–137. doi:10.1097/QAI.0000000000002413
7. Etoori D, Wringe A, Kabudula CW, et al. Misreporting of patient outcomes in the South African National HIV treatment database: consequences for programme planning, monitoring, and evaluation. *Front Public Health*. 2020;8:100. doi:10.3389/fpubh.2020.00100
8. Geng EH, Odeny TA, Lyamuya R, et al. Retention in care and patient-reported reasons for undocumented transfer or stopping care among HIV-infected patients on antiretroviral therapy in Eastern Africa: application of a sampling-based approach. *Clin Infect Dis*. 2016;62(7):935–944. doi:10.1093/cid/civ1004
9. Sikazwe I, Eshun-Wilson I, Sikombe K, et al. Retention and viral suppression in a cohort of HIV patients on antiretroviral therapy in Zambia: regionally representative estimates using a multistage-sampling-based approach. *PLoS Med*. 2019;16(5):e1002811. doi:10.1371/journal.pmed.1002918
10. Fox MP, Rosen S. A new cascade of HIV care for the era of “treat all”. *PLoS Med*. 2017;14(4):e1002268. doi:10.1371/journal.pmed.1002268
11. Koester KA, Johnson MO, Wood T, et al. The influence of the ‘good’ patient ideal on engagement in HIV care. *PLoS One*. 2019;14(3):e0214636. doi:10.1371/journal.pone.0214636
12. Cohen SM, Hu X, Sweeney P, Johnson AS, Hall HI. HIV viral suppression among persons with varying levels of engagement in HIV medical care, 19 US jurisdictions. *J Acquir Immune Defic Syndr*. 2014;67(5):519–527. doi:10.1097/QAI.0000000000000349
13. Fleishman JA, Yehia BR, Moore RD, Korthuis PT, Gebo KA, Network HIVR. Establishment, retention, and loss to follow-up in outpatient HIV care. *J Acquir Immune Defic Syndr*. 2012;60(3):249–259. doi:10.1097/QAI.0b013e318258c696
14. Mugavero MJ, Davila JA, Nevin CR, Giordano TP. From access to engagement: measuring retention in outpatient HIV clinical care. *AIDS Patient Care STDS*. 2010;24(10):607–613. doi:10.1089/apc.2010.0086
15. Saberi P, Johnson MO. Moving toward a novel and comprehensive behavioral composite of engagement in HIV care. *AIDS Care*. 2015;27(5):660–664. doi:10.1080/09540121.2014.986052
16. HIV Care CASCADE database. What is CASCADE? 2022. Available from: <https://hivcarecascade.com/research-based-on-cascade/>. Accessed April 26, 2023.
17. Mbuagbaw L, Jhuti D, Zakaryan G, et al. A database of randomized trials on the HIV care cascade (CASCADE Database): descriptive study. *JMIR Data*. 2022;3(1):e36874. doi:10.2196/36874
18. Kalichman SC, Katner H, Eaton LA, Banas E, Hill M, Kalichman MO. Comparative effects of telephone versus in-office behavioral counseling to improve HIV treatment outcomes among people living with HIV in a rural setting. *Transl Behav Med*. 2021;11(3):852–862. doi:10.1093/tbm/ibaa109
19. Chander G, Hutton HE, Lau B, Xu X, McCaul ME. Brief intervention decreases drinking frequency in HIV-infected, heavy drinking women: results of a randomized controlled trial. *J Acquir Immune Defic Syndr*. 2015;70(2):137–145. doi:10.1097/QAI.0000000000000679
20. Hosek SG, Harper GW, Lemos D, et al. Project ACCEPT: evaluation of a group-based intervention to improve engagement in care for youth newly diagnosed with HIV. *AIDS Behav*. 2018;22(8):2650–2661. doi:10.1007/s10461-018-2034-4
21. Kuo I, Liu T, Patrick R, et al. Use of an mHealth intervention to improve engagement in HIV community-based care among persons recently released from a correctional facility in Washington, DC: a Pilot Study. *AIDS Behav*. 2019;23(4):1016–1031. doi:10.1007/s10461-018-02389-1
22. Sikkema KJ, Mulawa MI, Robertson C, et al. Improving AIDS Care After Trauma (ImpACT): pilot outcomes of a coping intervention among HIV-Infected Women with Sexual Trauma in South Africa. *AIDS Behav*. 2018;22(3):1039–1052. doi:10.1007/s10461-017-2013-1
23. Chang LW, Nakigozi G, Billieux VG, et al. Effectiveness of peer support on care engagement and preventive care intervention utilization among pre-antiretroviral therapy, HIV-infected adults in Rakai, Uganda: a randomized trial. *AIDS Behav*. 2015;19(10):1742–1751. doi:10.1007/s10461-015-1159-y
24. Stephenson R, Garofalo R, Sullivan PS, et al. Stronger together: results from a randomized controlled efficacy trial of a dyadic intervention to improve engagement in HIV care among serodiscordant male couples in three US Cities. *AIDS Behav*. 2021;25(8):2369–2381. doi:10.1007/s10461-021-03199-8
25. Towe VL, Wiewel EW, Zhong Y, Linnemayr S, Johnson R, Rojas J. A randomized controlled trial of a rapid re-housing intervention for homeless persons living with HIV/AIDS: impact on Housing and HIV medical outcomes. *AIDS Behav*. 2019;23(9):2315–2325. doi:10.1007/s10461-019-02461-4
26. Carey MP, Dunne EM, Norris A, et al. Telephone-delivered mindfulness training to promote medication adherence and reduce sexual risk behavior among persons living with HIV: an exploratory clinical trial. *AIDS Behav*. 2020;24(6):1912–1928. doi:10.1007/s10461-019-02768-2
27. Ayer R, Poudel KC, Kikuchi K, Ghimire M, Shibamura A, Jimba M. Nurse-led mobile phone voice call reminder and on-time antiretroviral pills pick-up in Nepal: a randomized controlled trial. *AIDS Behav*. 2021;25(6):1923–1934. doi:10.1007/s10461-020-03122-7

28. Lechner SC, Antoni MH, Lydston D, et al. Cognitive-behavioral interventions improve quality of life in women with AIDS. *J Psychosom Res.* **2003**;54(3):253–261. doi:10.1016/s0022-3999(02)00480-4
29. Richter L, Rotheram-Borus MJ, Van Heerden A, et al. Pregnant women living with HIV (WLH) supported at clinics by peer WLH: a cluster randomized controlled trial. *AIDS Behav.* **2014**;18(4):706–715. doi:10.1007/s10461-014-0694-2
30. Sorensen JL, Dilley J, London J, Okin RL, Delucchi KL, Phibbs CS. Case management for substance abusers with HIV/AIDS: a randomized clinical trial. *Am J Drug Alcohol Abuse.* **2003**;29(1):133–150. doi:10.1081/ada-120018843
31. Giordano TP, Gifford AL, White AC Jr et al. Retention in care: a challenge to survival with HIV infection. *Clin Infect Dis.* **2007**;44(11):1493–1499. doi:10.1086/516778
32. Dean BB, Hart RL, Buchacz K, et al. HIV laboratory monitoring reliably identifies persons engaged in care. *J Acquir Immune Defic Syndr.* **2015**;68(2):133–139. doi:10.1097/QAI.0000000000000406
33. Graham SM, Micheni M, Secor A, et al. HIV care engagement and ART adherence among Kenyan gay, bisexual, and other men who have sex with men: a multi-level model informed by qualitative research. *AIDS Care.* **2018**;30(sup5):S97–S105. doi:10.1080/09540121.2018.1515471
34. Holtzman CW, Brady KA, Yehia BR. Retention in care and medication adherence: current challenges to antiretroviral therapy success. *Drugs.* **2015**;75(5):445–454. doi:10.1007/s40265-015-0373-2
35. Dietz E, Clum GA, Chung S-E, et al. Adherence to scheduled appointments among HIV-infected female youth in five U.S. Cities. *Journal of Adolescent Health.* **2010**;46(3):278–283. doi:10.1016/j.jadohealth.2009.06.013
36. Sewell J, Daskalopoulou M, Nakagawa F, et al. Accuracy of self-report of HIV viral load among people with HIV on antiretroviral treatment. *HIV Med.* **2017**;18(7):463–473. doi:10.1111/hiv.12477
37. Da W, Li X, Qiao S, Zhou Y, Shen Z. Evaluation of self-report adherence measures and their associations with detectable viral load among people living with HIV (PLHIV) in China. *PLoS One.* **2018**;13(8):e0203032. doi:10.1371/journal.pone.0203032
38. Mallinson RK, Rajabian S, Coleman S. The provider role in client engagement in HIV care. *AIDS Patient Care STDS.* **2007**;21(s1):S-77–S-84. doi:10.1089/apc.2007.9984

HIV/AIDS - Research and Palliative Care

Dovepress

Publish your work in this journal

HIV/AIDS - Research and Palliative Care is an international, peer-reviewed open-access journal focusing on advances in research in HIV, its clinical progression and management options including antiviral treatment, palliative care and public healthcare policies to control viral spread. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/hiv-aids—research-and-palliative-care-journal>