# Can an adolescent HIV psychosocial attrition risk assessment tool predict loss to follow-up? Preliminary findings from Uganda

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## Background

Retention in HIV care impacts medication adherence and viral suppression, and factors influencing attrition from HIV care are multifactorial for adolescents. To help identify adolescents at risk for loss to follow up (LTFU) and more effectively target interventions to improve retention and viral load (VL) suppression, we are developing and evaluating an adolescent psychosocial attrition risk assessment (APARA) tool for predicting attrition from HIV care among adolescents in Uganda. In this phase of the study, we sought to evaluate the ability of the tool to predict risk of attrition of adolescents living with HIV (ALHIV).

## Research Questions

We sought to answer the following research questions:

- Is the psychosocial risk assessment tool effective at predicting attrition of ALHIV from HIV care?
- What cut-off score should be used to categorize ALHIV as "at risk" of attrition?

## Methods

### *Implementation*

The APARA tool was implemented from November 2021 through July 2022, in 14 districts in the Central and Western regions of Uganda.

20 high-burden facilities were randomly selected for implementation; 8 were hospitals and the remaining 11 were health centers or clinics.

ALHIV, aged 15-19 years, who are currently on antiretroviral therapy (ART) and active in care at the facility were eligible for enrollment.

Healthcare workers administered the APARA tool at enrollment and at each standard-of-care visit for 6 months.

Patient data, such as ART visit dates and most recent viral load, were extracted from study participants' medical records.

### *Analysis*

An adolescent was considered LTFU if they had not returned to the facility within 28 days of their next scheduled appointment.

**APARA Tool Effectiveness**

Diagnostic accuracy tests

- Individual diagnostic accuracy tests were run on LTFU and each question to determine the sensitivity and specificity of each question.
- Diagnostic accuracy tests were run on LTFU and each cut-off point to determine the sensitivity and specificity of each cut-off point and create a receiver operating characteristic (ROC) curve.

**VLS Predictors**

Stepwise backwards model

- Univariate regressions were run to test the relationship between elevated viral load and a list of client characteristics.
- All variables significant at the 10% level were included in a multivariate regression.
- The variable with the highest non-significant p-value was removed and the regression was rerun until the final model consisted of only variables with significant p-values (at the 5% level).

## Results

### *Sample Characteristics*

By January 2022, 604 adolescents had been enrolled. Of those, 596 were included for analysis; 8 adolescents had transferred out of the facility from which they were recruited and thus were dropped from the analysis. LTFU status was determined for 565 adolescents: 12% were LTFU by June 2022 while 88% were retained in care. A greater proportion of those that were LTFU had been on ART for less than one year, had a history of depression, and were virally unsuppressed, compared to those retained in care *(Table 1).*

**Table 1. Sample Characteristics**

| | Lost to Follow-Up | | Retained in Care | | Total | |
|---|---|---|---|---|---|---|
| | n/median | %/IQR | n/median | %/IQR | n/median | %/IQR |
| | 67 | 12% | 498 | 88% | 565 | 100% |
| **Characteristics** | | | | | | |
| Sex | | | | | | |
| *Female* | 33 | 49% | 284 | 57% | 317 | 56% |
| *Male* | 34 | 51% | 214 | 43% | 248 | 44% |
| Median age (years) | 17.4 | (15.9 - 18.8) | 17.9 | (16.4 - 18.9) | 17.8 | (16.4 - 18.9) |
| Median time on ART (years) | 10.5 | (5.0 - 13.0) | 8.8 | (5.7 - 12.6) | 8.9 | (5.6 - 12.7) |
| *On ART for < 1 year* | 9 | 13% | 49 | 10% | 58 | 10% |
| National Ugandan | 62 | 93% | 484 | 97% | 546 | 97% |
| History of Depression | 16 | 24% | 58 | 12% | 74 | 13% |
| Median Baseline CD4 Result | 523 | (271 - 860) | 514 | (249 - 843) | 517 | (250 - 844) |
| Regimen | | | | | | |
| *TLD* | 53 | 79% | 372 | 75% | 425 | 75% |
| *Other* | 14 | 21% | 126 | 25% | 140 | 25% |
| Model of Care | | | | | | |
| *Facility Based Individual Management* | 39 | 58% | 85 | 17% | 124 | 22% |
| *Facility Based Group* | 22 | 33% | 354 | 71% | 376 | 67% |
| *Fast Track Drug Pick-up* | 6 | 9% | 59 | 12% | 65 | 12% |
| Virally Suppressed | 45 | 67% | 438 | 88% | 483 | 85% |
| Median APARA Tool Score | 6 | (4 – 7) | 5 | (3 – 7) | 5 | (3 – 7) |

### *APARA Tool Effectiveness*

Six questions on the APARA tool (*Figure 1)* were significantly associated with LTFU status: Q1, Q2, Q7, Q8, Q9, Q14. When the tool was evaluated for overall effectiveness in its ability to predict LTFU status, the ROC curve was maximized at 0.58 with a corresponding sensitivity of 67% and specificity of 48% *(Figure 2)*.

### *VLS Predictors*

Of the 557 adolescents with a VL result, 92% were virally suppressed. An adolescent was more likely to be virally unsuppressed if they had fair or poor adherence (Odds Ratio (OR): 5.45). An adolescent was more likely to be virally suppressed if they were on first-line treatment (OR: 0.25) or if they received an ARV refill for 60 or more days (OR: 0.18) *(Table 2).*

**Table 2. VLS Predictors**

| | Unadjusted | | Adjusted | |
|---|---|---|---|---|
| **Outcome: elevated viral load (n = 513)** | **Odds Ratio** | **[95% Conf. Interval]** | **Odds Ratio** | **[95% Conf. Interval]** |
| 1L treatment | 0.26 | (0.13 - 0.52) | 0.25 | (0.11 - 0.58) |
| Received an ARV refill for 60+ days | 0.10 | (0.05 - 0.22) | 0.18 | (0.08 - 0.40) |
| Fair or poor adherence | 10.30 | (4.05 - 26.21) | 5.45 | (1.47 - 20.17) |

**Figure 1. APARA Tool**

Adolescent Psychosocial Attrition Risk Assessment (APARA) Tool

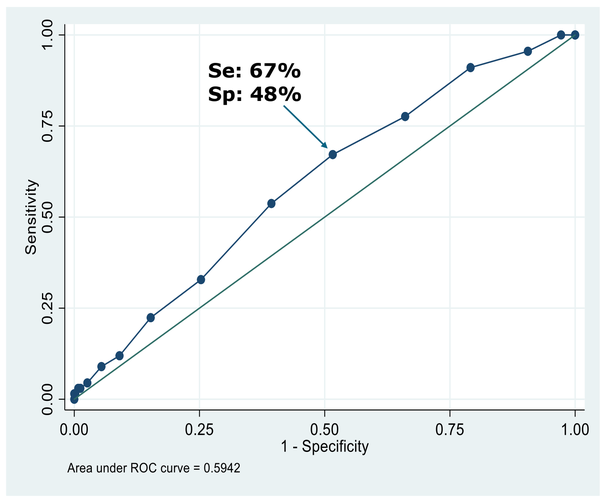
Date Administered: _____ *(DD/MM/YY)* Participant Study ID: _____

Administration Point *(circle one)*: triage/ clinician room/ counsellor room Cadre *(circle one)*: peer/ clinician/ counsellor

**Instructions: Check 'Yes' or 'No' for each question and write the score for the option chosen (1 or 0) per question.**

| No. | Domain | Question | Answer | Score |
|---|---|---|---|---|
| 1 | HOME[1,9] | Do you live with one or more adult(s) who is primarily responsible for providing for the home (i.e., shelter, food)? | ☐Yes (1) ☐ No (0) | |
| 2 | GOALS[10] | Do you feel motivated to achieve your future goals or plans? | ☐Yes (1) ☐ No (0) | |
| 3 | FOOD SECURITY [2,9] | Is this statement true? You did NOT miss a meal because you or your family could not afford to provide it in the past 30 days. | ☐Yes (1) ☐ No (0) | |
| 4 | HEALTH LITERACY | Do you feel that you have sufficient and accurate information to manage your overall health? | ☐Yes (1) ☐ No (0) | |
| 5 | TREATMENT LITERACY [5] | Do you feel that you have sufficient information about the importance and administration of ARVs and other medication you receive from this clinic? | ☐Yes (1) ☐ No (0) | |
| 6 | EDUCATION | Are you currently enrolled in school? | ☐Yes (1) ☐ No (0) | |
| 7 | PARENTAL SUPPORT | Do you regularly feel supported and cared for by your parent or primary caretaker? | ☐Yes (1) ☐ No (0) | |
| 8 | ENACTED STIGMA[9] | Do you ever experience discrimination (i.e., teasing, name calling, bullying) from peers or others while at school, in the community, or at home? | ☐Yes (0) ☐ No (1) | |
| 9 | DISCLOSURE | Is there anyone in your daily life that you feel you have to hide your medication from, for fear of disclosing? | ☐Yes (0) ☐ No (1) | |
| 10 | MEDICATION ADHERENCE [6] | Have you missed a dose of your ARV medication in the past 30 days? | ☐Yes (0) ☐ No (1) | |
| 11 | MENTAL HEALTH [7] | Have you felt depressed, down, sad, or hopeless for several days or more in the past 2 weeks? | ☐Yes (0) ☐ No (1) | |
| 12 | TRANSPORTATION[9] | Has lack of transport kept you away your medical appointments, or away from places needed for daily living (i.e., work, market)? | ☐Yes (0) ☐ No (1) | |
| 13 | DISTANCE[8] | On a typical visit, does it take you an hour or more to get to the facility? | ☐Yes (0) ☐ No (1) | |
| 14 | CARE ENGAGEMENT | Have you ever disengaged (left) from HIV care before and had to reinitiate on ART? | ☐Yes (0) ☐ No (1) | |
| 15 | ATTENDANCE | Does your daily schedule ever prevent you from attending facility (i.e., work or school schedules)? | ☐Yes (0) ☐ No (1) | |
| 16 | EMOTIONAL SUPPORT [8] | Do you feel that you have someone you trust to turn to if you need help with your health or personal life? | ☐Yes (1) ☐ No (0) | |
| 17 | FACILITY ENVIRONMENT | Do you participate in activities with peers at the facilities (e.g., games, support groups)? | ☐Yes (1) ☐ No (0) | |
| 18 | HEALTH NEEDS | Do you feel that your health needs are fully addressed and cared for at every visit to the facility? | ☐Yes (1) ☐ No (0) | |
| 19 | CONFIDENTIALITY [8] | At the facility where you typically receive care, do you feel that the information you share will be kept safe and confidential? | ☐Yes (1) ☐ No (0) | |
| 20 | VIOLENCE[8,9] | Are you a survivor of sexual, physical, or emotional violence? | ☐Yes (0) ☐ No (1) | |
| | | | TOTAL SCORE | |

**Figure 2. APARA Tool ROC Curve**




## Conclusions

Preliminary results have revealed that the APARA tool is not effective in predicting LTFU status among adolescents in our study cohort:

- Area under the ROC curve is maximized at 0.58, suggesting that the tool does not perform much better than chance at differentiating between adolescents who are at risk of becoming LTFU and those who are not.
- While the tool itself may not be able to predict LTFU status, it may help give healthcare workers insights into the psychosocial issues affecting ALHIV they support and facilitate connecting them with the appropriate resources and interventions.
  - For example, knowing that an adolescent is being discriminated against or hiding their medication could be a warning that the healthcare worker should spend extra time counselling the client.
- Most of these adolescents have been in care for an average of 10 years. While we ran sensitivity analyses on those in care for less than one year, our numbers were too low to be powered to have any meaningful results. It is possible that a tool like this could be powerful if used among adolescents who are newly initiating onto ART.

Our results also show that adolescents who receive a multi-month script of 60 days or more are more likely to be virally suppressed, indicating that efforts to transition adolescents in care to multi-month scripts result in positive clinical outcomes.

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