Outcomes Across the Tuberculosis Treatment Cascade Among Adolescents in Haiti

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Background

- Limited data are available on tuberculosis (TB) treatment outcomes among adolescents, especially among HIV co-infected adolescents.
- Adolescents are at particularly high risk for poor HIV health outcomes, and as TB is the leading cause of death among HIV-infected persons, further research on treatment outcomes and risk factors for adolescents with TB is warranted.
- In Haiti, the highest burden of TB in women occurs in the 15-24 age bracket (1,476 new cases in 2012).
- We describe the TB treatment cascade among adolescents at youth ages 10-24 including TB diagnosis, treatment initiation, retention in care, and treatment outcomes among adolescents with smear-positive disease, stratified by HIV status at the GHESKIO clinic in Port-au-Prince, Haiti.

Study objectives:

1. To determine the number and proportion of adolescents with smear-positive TB at the GHESKIO clinic in Port-au-Prince, Haiti who are retained at each step in the TB treatment cascade.
2. To compare outcomes including completing treatment/cure, treatment failure, treatment abandonment, and death, by adolescent age group, HIV status, and same-day TB treatment status.

Methods

Study Setting:
- Haiti is the poorest country in the Western Hemisphere with the highest adolescent and adult HIV prevalence (0.4% and 1.8%, respectively).
- Haiti has the highest burden of tuberculosis (TB) in the Americas, with estimated prevalence of 244/100,000 population; 16% of TB patients are co-infected with HIV.
- GHESKIO was established in 1982 and is the largest public HIV and TB clinic in Haiti and located in Port-au-Prince. GHESKIO provides HIV and TB testing and treatment free of charge to patients.

Study Population and Study Design:
- Retrospective cohort study of adolescents and youth ages 10-24 diagnosed with smear-positive TB at the GHESKIO clinic between January 2011 and October 2014.
- Routinely-collected patient-level data was extracted from TB register books and electronic medical record (EMR)

Steps in the treatment cascade:
- Diagnosis of smear-positive TB: AFB or Xpert documentation in EMR
- Treatment initiation: documented RIF/INH based regimen in EMR
- Retention in TB care at 2 months: TB care visit between 1 and 3 months from testing
- TB treatment completion/cure: no positive smear at 2,5, and 6 month tests.

Outcome definitions:
- Cure: no positive smear at 2, 5, and 6 months tests.
- Treatment abandonment: no clinic visit within 5 months of diagnosis
- Treatment failure: a smear-positive test after 5 months from treatment initiation
- Death: ascertained from medical records

Statistical Analysis: Retention across the treatment cascade and treatment outcomes were stratified by HIV status and same-day treatment. Differences were assessed by Chi-square test.

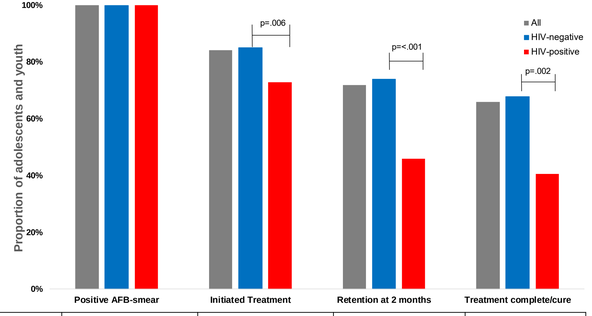
Results

Table 1. Baseline characteristics of 1,005 sputum positive adolescents and young adults (January 2011 and October 2014) by age group

	Entire Population (N=1,005)	Ages 10-15 (N=98)	Ages 16-19 (N=323)	Ages 20-24 (N=584)
Female	412 (41%)	56 (57%)	132(41%)	224 (38%)
Weight (kg), median (IQR)	53 [47-59]	46 [42-54]	52 [47-58]	55 [50-60]
Same-day TB TX*	791 (79%)	82 (84%)	257 (80%)	452 (77%)
Ever initiate TB TX	846 (84%)	83 (85%)	262 (81%)	501 (86%)
TB TX Regimen				
RHEZ**	826 (82%)	1 (1%)	5 (2%)	14 (2%)
SRHEZ***	20 (2%)	83 (85%)	270 (84%)	473 (81%)
Missing	159 (16%)	14 (14%)	48 (14%)	97(17%)
HIV co-infection	74 (7%)	2 (2%)	18 (6%)	54 (9%)
Timing of ART Status among HIV+	HIV-infected (N=74)	N=2 (2%)	N=18 (5.6%)	N=54 (9.2%)
Initiated prior to TB diagnosis	16 (22%)	1 (50%)	6 (33%)	9 (17%)
Initiated after TB treatment	45 (61%)	1 (50%)	10 (56%)	34 (63%)
Never initiated	13 (17%)	0 (0%)	2 (11%)	11 (20%)

*Treatment
**RHEZ: Rifampin, Isoniazid, Pyrazinamide, Ethambutol
***SRHEZ: Streptomycin, Rifampin, Isoniazid, Pyrazinamide, Ethambutol

Figure 1. TB Treatment Cascade Among Adolescents and Youth Ages 10-24 in Haiti



All N(%)	**1,005 (100%)**	**846 (84%)**	**722 (72%)**	**662 (66%)**
HIV-Negative	**931 (100%)**	**792 (85%)**	**688 (74%)**	**632 (68%)**
HIV-Positive	**74 (100%)**	**54 (73%)**	**34 (46%)**	**30 (41%)**

Table 2. TB Treatment outcomes for 846 sputum-positive patients who started TB treatment by HIV status and same-day treatment status

Treatment outcome	Entire population (N=846)	HIV- (N=792)	HIV+ (N=54)	Same-day TX (N=791)	Not Same-day TX (N=55)
Cured/ Completed Treatment	662 (78%)	632 (80%)*	30 (56%)*	624 (79%)*	38 (69%)*
Failed treatment	13 (2%)	13 (1%)	0 (0%)	10 (1%)	3 (5%)
Abandoned treatment	163 (19%)	142 (18%)*	21 (39%)*	150 (19%)*	13 (24%)*
Died	8 (1%)	5 (1%)	3 (5%)	7 (1%)	1 (2%)

*P value, calculated by Chi-square test, <.01

Patience Characteristics (Table 1):
- 1,005 individuals were diagnosed with TB, of whom 41% were female, median age 20 (IQR 18-23), and 64% lived in a slum-area of Port-au-Prince.
- Seventy-four (7.4%) were HIV-positive at the time of TB diagnosis, with a median CD4 cell count of 332 cells/mL (IQR 194-558) at testing.

Treatment Cascade (Figure 1):
- A total of 1,000 individuals were diagnosed with smear-positive TB, 846 (84%) initiated treatment, 722 (72%) attended a clinic visit 2-months from initiation, and 66% were defined as completed treatment or cured.

Comparing HIV-infected to HIV-uninfected:
- 73% vs. 85% started treatment (p =.006)
- 46% vs. 74% were retained at 2 months (p<.001)
- 41% vs. 68% completed treatment/cured (p=.002)

Outcomes stratified by same-day treatment (Table 2):
- Among 846 patients who started treatment, 791 (93%) started the same day as diagnosis.
- Participants who started treatment the same day as diagnosis were more likely to have a treatment complete/cure outcome (p <.001).

Outcomes stratified by HIV-status:
- Among 846 patients who started treatment, 54 (6.4%) were HIV-infected.
- Treatment abandonment was associated with being HIV-positive (p<.001). There was no significant difference among HIV-positive and HIV-negative adolescents in treatment failure (0% versus 1%) or death (4% versus 1%).

Conclusion

- Among all adolescents and youth diagnosed with smear-positive TB, 84% ever initiate TB treatment, 72% are retained at 2 months from testing, and 66% complete treatment or are cured.
- The greatest loss of adolescents across the TB care cascade occurs between diagnosis and treatment initiation. Reasons for such attrition need to be explored and may include undocumented transfer to other clinics, lack of family involvement, and challenges in tracing, among others. Interventions are needed to engage teens early in the TB treatment cascade.
- Adolescents and youth co-infected with HIV and TB were significantly more likely to be lost across all steps of the TB care cascade.
- Among adolescents who do initiate treatment, those co-infected with HIV and TB have poorer outcomes and are significantly more likely to abandon treatment and significantly less likely to complete treatment or be cured.
- Interventions including same-day TB treatment initiation can improve the proportion of all adolescents with positive treatment outcomes. A particular focus is needed on improving retention and positive treatment outcomes among adolescents co-infected with HIV and TB.

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