Cross-Sectional Surveillance of HIV Drug Resistance in Paediatric Patients receiving Antiretroviral Therapy in South Africa

Gillian Hunt
Centre for HIV and STI
National Institute for Communicable Diseases
ART Scale-up and Emergence of HIV Drug Resistance

- Rapid scale-up of ART has provided life-saving treatment to persons living with HIV in South Africa
- 90-90-90 targets
  - improving access and adherence to ART
- Concerns about emergence of HIV drug resistance (HIVDR) locally and globally
- HIVDR management and monitoring strategies:
  - Identify ART clinic and programme factors associated with the emergence of HIVDR
  - allow for corrective action at both national and local levels
  - provide info to support choice of current and future first- and second-line ART regimens for both adults and children
ART Scale-up and Emergence of HIV Drug Resistance

- Children on (ART) are at an increased risk of developing antiretroviral drug resistance
  - limited paediatric formulation options
  - poor palatability of medications
  - inadequate dosing due to weight change
  - exposure to maternal ART
  - limited knowledge of ARV drug pharmacokinetics and pharmacodynamics
  - dependence of caregivers for adherence

- A few small studies from South Africa have confirmed high prevalence of resistant mutations in children, and higher rates of virological failure (VF) than in adults.

- There is a need to monitor the trends in HIV drug resistance among children on ART who have experienced VF in order to recommend appropriate second- and third-line regimens for them.
Study Rationale

- A national facility based study of HIVDR among children on ART who are experiencing VF was implemented in 2017

- Specific Objectives:
  - To determine the prevalence of HIVDR (defined as ≥ 1 drug resistance mutation by genotype) in children on ART with VF (VL ≥ 1000 copies/ml).
  - To determine the prevalence of HIVDR in children on ART with VF by age group.
  - To determine the prevalence of HIVDR in children on ART with VF by regimen.
  - To describe the pattern of HIVDR in children with VF
Study Design

- Cross-sectional survey at 45 sentinel ART sites in 9 provinces
  - Clinic selection based on high paediatric VL volume of >1000cpm
- Sample size: 1475 specimens spanning 1-5, 5-10, 10-15 and 15 – 19 years age groups
Participant Selection

- Consecutive sampling of eligible patients
  - 33 patients per facility
  - On ART for >1 year
  - Recent VL >1000 copies/ml
  - Any regimen
  - Collect whole blood and minimal clinical information

- Testing:
  - Next generation sequencing to look for mutations associated with HIVDR
  - Results returned to clinic before second VL / regimen switch
Preliminary Analysis

- 23 sites enrolled
- 327 specimens collected
- 185 DCF captured

**Gender**
- Males: 51%
- Females: 49%

**Age distribution**
- 1 to 5: 19%
- 5 to 10: 18%
- 10 to 15: 40%
- 15 to 19: 4%
- Not recorded: 4%

**Regimen**
- PI: 33%
- NNRTI: 61%
- NRTI: 5%

**Resistance patterns**
- Wild-type: 44%
- NNRTI: 15%
- NRTI: 12%
- NRTI+NNRTI: 11%
- PI+NRTI: 4%
- PI+NRTI+NNRTI: 2%
- No amplification: 12%
Mutations detected

Preliminary Analysis
SUMMARY

- Drug resistance mutations were detected in 88% in paediatric patients failing ART
- Most patients harboured dual-class NNRTI and NRTI resistance
- Major PI mutations were detected in 7% of failing patients, despite most patients (>60%) receiving a PI-based regimen
ACKNOWLEDGEMENTS

- All participants
- All HCW assisting in the survey
- Provincial departments for assisting with study approvals
- The survey is funded by PEPFAR (CDC-SA) National Health Laboratory Service Grant Number: GH001631