

Outcomes and Outpatient Costs of Pediatric Antiretroviral Therapy in Zambia

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Background

- At the end of 2010, 456,000 children in low- and middle-income countries were reported to be on ART
 - Represents an estimated 23% of children in need of ART
 - 85% are in sub-Saharan Africa
- Treatment outcomes for pediatric cohorts are encouraging
 - Viral suppression and mortality comparable to high-income settings¹
 - Concerns about loss to follow up and advanced age and disease stage at initiation²
- Almost no information is available about treatment costs
 - One published estimate (facility-based; five countries)³
 - No estimates for most countries and no cohort-based studies
 - Better cost information is needed to revise policies and guidelines, plan future budgets, and improve program outcomes

¹Ciaranello et al, *CID* 2009; ²Kids-ART-LINC Collaboration, *JAIDS* 2008; ³Menzies et al, *AIDS* 2011

Objective

- Estimate the average outpatient cost of providing ART to children attending public sector clinics in Zambia during the first three years after treatment initiation, stratified by patient outcome and service delivery site

Methods: Study Population

- 681 pediatric patients at three treatment sites in Zambia
 - Urban primary clinic
 - Rural district hospital
 - Urban dedicated pediatric clinic
- Inclusion criteria
 - Initiated ART at the study sites between 2006 and 2009
 - <15 years of age at ART initiation
 - Not known to have transferred to another treatment site during the study period

Methods: Patient Costs

- Costs estimated from provider perspective for all outpatient resources used by subjects during first 12, 24, or 36 months after ART initiation
- Variable costs from medical record review
 - ARVs, non-ARV medications, laboratory tests, outpatient visits
- Fixed costs from facility records and patient volumes
 - Infrastructure (buildings), equipment, furniture, supplies
- Costs are reported in 2011 USD

Methods: Patient Outcomes

- Outcomes assigned at 12, 24, or 36 month point after treatment initiation
- Outcomes defined based on existing data available in medical records

No longer in care

Died; *or*
Lost to follow up

In care but not responding

Still in care; *and*
Deteriorating clinical condition; *or*
Detectable viral load; *or*
Inadequate CD4 cell response

In care and responding

Still in care; *and*
Acceptable clinical condition; *and*
Undetectable viral load if viral load reported; *and*
Adequate CD4 response if CD4 result reported

Preliminary Results: Cohort Characteristics

	Urban clinic	Rural hospital	Pediatric clinic
Sample size	187	262	232
Median age at initiation, years [IQR]	5.4 [2.3-8.4]	2.6 [1.3-6.4]	1.9 [1.0-6.0]
Median CD4% at initiation [IQR]	12.5 [8.5-16.2]	n.a.	16.2 [10.0-22.0]
Regimen at ART initiation, % of patients in sample			
d4T + 3TC + NVP or EFV	60%	77%	75%
AZT + 3TC + NVP or EFV	40%	15%	6%
Other regimens	0%	9%	20%

Preliminary Results: Patient Outcomes

Patient outcome (% of study sample)	Urban clinic	Rural hospital	Pediatric clinic
12 months	n=187	n=262	n=232
In care and responding	67	46	68
In care but not responding	12	13	6
No longer in care	21	40	26
24 months	n=126	n=185	n=120
In care and responding	61	54	63
In care but not responding	8	4	5
No longer in care	31	42	32
36 months	n=120	n=120	n=0
In care and responding	60	51	n.a.
In care but not responding	3	4	n.a.
No longer in care	37	45	n.a.

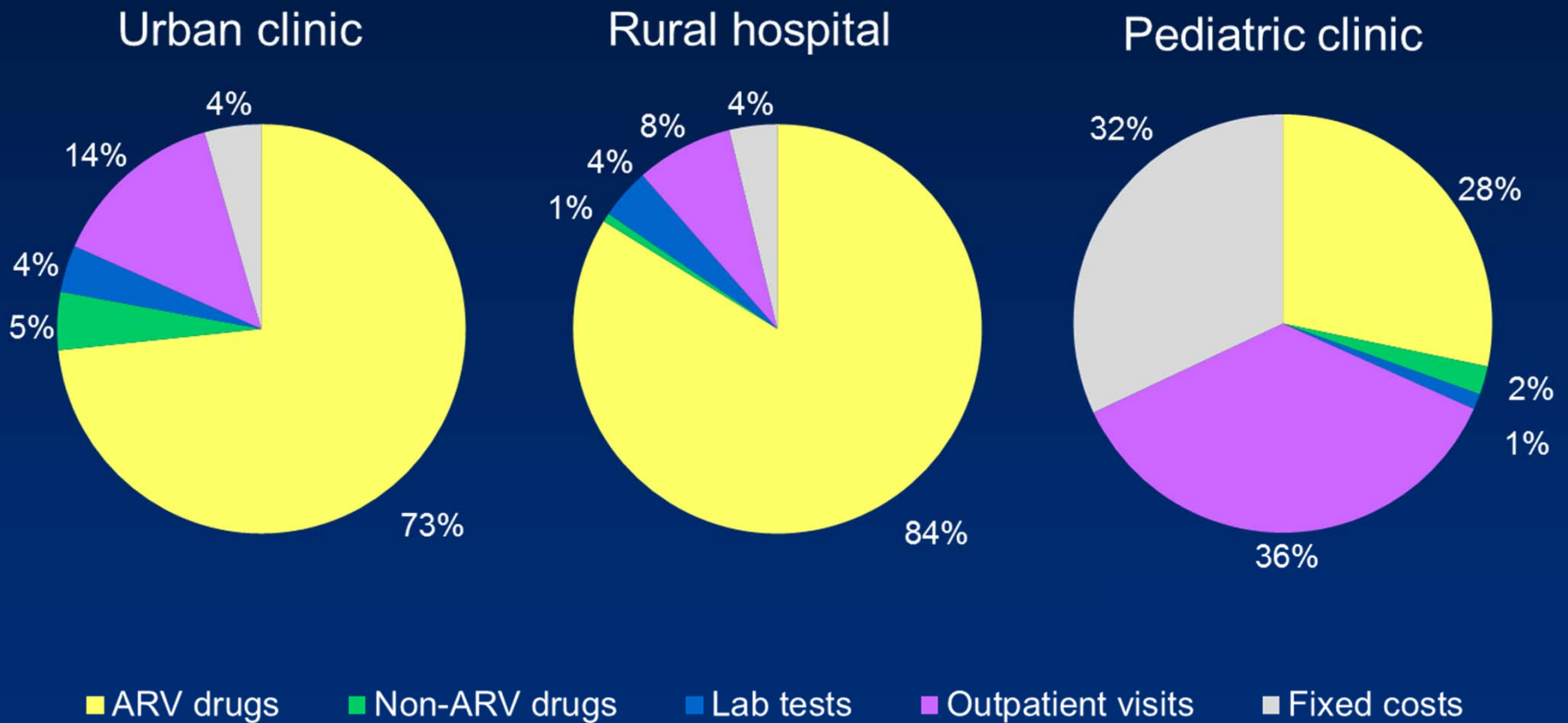
Preliminary Results: Cost per Year in Care

Average cost per patient, 2011 USD	Urban clinic	Rural hospital	Pediatric clinic
All patients initiated			
Year 1	\$231	\$140	\$425
Year 2	\$167	\$88	\$272
Year 3	\$126	\$74	n.a.
Patients remaining in care and responding			
Year 1	\$279	\$193	\$506
Year 2	\$234	\$149	\$376
Year 3	\$191	\$132	n.a.
Adult patients treated at same sites (Year 1 only)			
All patients initiated	\$158	\$228	n.a.
Patients remaining in care and responding	\$195	\$274	n.a.

Preliminary Results: Resource Utilization and Unit Costs

Resource	Urban clinic	Rural hospital	Pediatric clinic
ARVs, average cost/year	\$177.25	\$140.70	\$126.98
CD4 counts or percentages			
Cost/test	\$2.87	\$10.19	\$9.53
Average number/year	1.7	0.5	0.5
Clinic visits			
Cost/visit	\$2.69	\$1.47	\$21.42
Average number/year	10.6	6.5	7.6
Fixed cost/patient-month	\$0.93	\$0.55	\$14.52
Patients per clinical provider at site, 2010	918	1,209	379

Preliminary Results: Cost Breakdown



Limitations

- Results are from only three study sites so far
- Results are average costs and may not reflect the cost of further program expansion
- The analysis excludes
 - Costs of inpatient care
 - Costs incurred before a patient initiates ART
 - Costs incurred by the patients
 - Costs for program management above the facility level
- Results reflect costs and outcomes of treatment for patients who initiated ART prior to adoption of early infant diagnosis and treatment guidelines in Zambia

Conclusions

- At the urban clinic and rural hospital
 - Average cost of pediatric ART is very low and similar to cost for adults at the same sites
 - Large share of cost (70-80%) is for ARVs, leaving less room for cost reductions in other components
- At the pediatric clinic
 - Average cost is relatively high, due mainly to low patient volume
 - Potential for increase in efficiency by increasing patient volume
- At all three sites
 - There is a need to improve outcomes for the large proportion of children who do not remain in care
 - Improving retention in care will likely result in increased overall treatment program costs

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