Costs and Outcomes of AIDS Treatment Delivery in South Africa: How Much Does It Cost to Keep A Patient In Care and Responding?

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Objectives

- Little is known about the costs of providing ART in South Africa under different delivery models or about the how resource inputs affect patient outcomes.
- Objectives were to:
  - Develop a practical methodology for evaluating cost-effectiveness using existing data.
  - For various models of treatment delivery, estimate the cost per patient:
    - Initiated on ART.
    - In care and responding to therapy 12 months after ART initiation.
  - Explore the relationship between resources used and outcomes achieved.

Study Design

- Cost-outcome analysis (not standard cost-effectiveness analysis).
- Retrospective medical record review.
- Cost estimates include all resources used by provider. (Not limited to resources paid for by site or cost to funder or donor.)
- Steps:
  - Selected sites representing common or promising models of treatment delivery in South Africa.
  - Selected a representative sample of ART patients from each site.
  - Calculated the cost of all resources used to treat each subject for the 12 months following ART initiation.
  - Determined each study subject's outcome 12 months after initiation of ART.
  - Estimate the average cost per patient treated and per outcome achieved.

Site Selection and Study Population

- Site selection criteria
  - >100 adult patients initiated on ART in first half of 2005
  - Patient records computerized or well maintained hard copy files
  - Agreement with the site and relevant authorities.
- Sample selection criteria
  - >18 years old
  - Eligible for treatment in 2005
  - Started treatment at site within a year of eligibility
  - Did not transfer to another treatment site in the first 12 months.
- Enrolled first 100 eligible patients initiated on ART in 2005.

Data Collection

- Medical record review for patients in sample:
  - patient characteristics
  - baseline health data (t = 0)
  - resource usage data (t = 0 …12)
  - outcome health data (t = 12)
- Unit cost estimates:
  - Obtained from site management and site records
  - Variable costs (drugs, labs, and clinicians' time)
  - Fixed costs (infrastructure, equipment, shared staff, etc.).

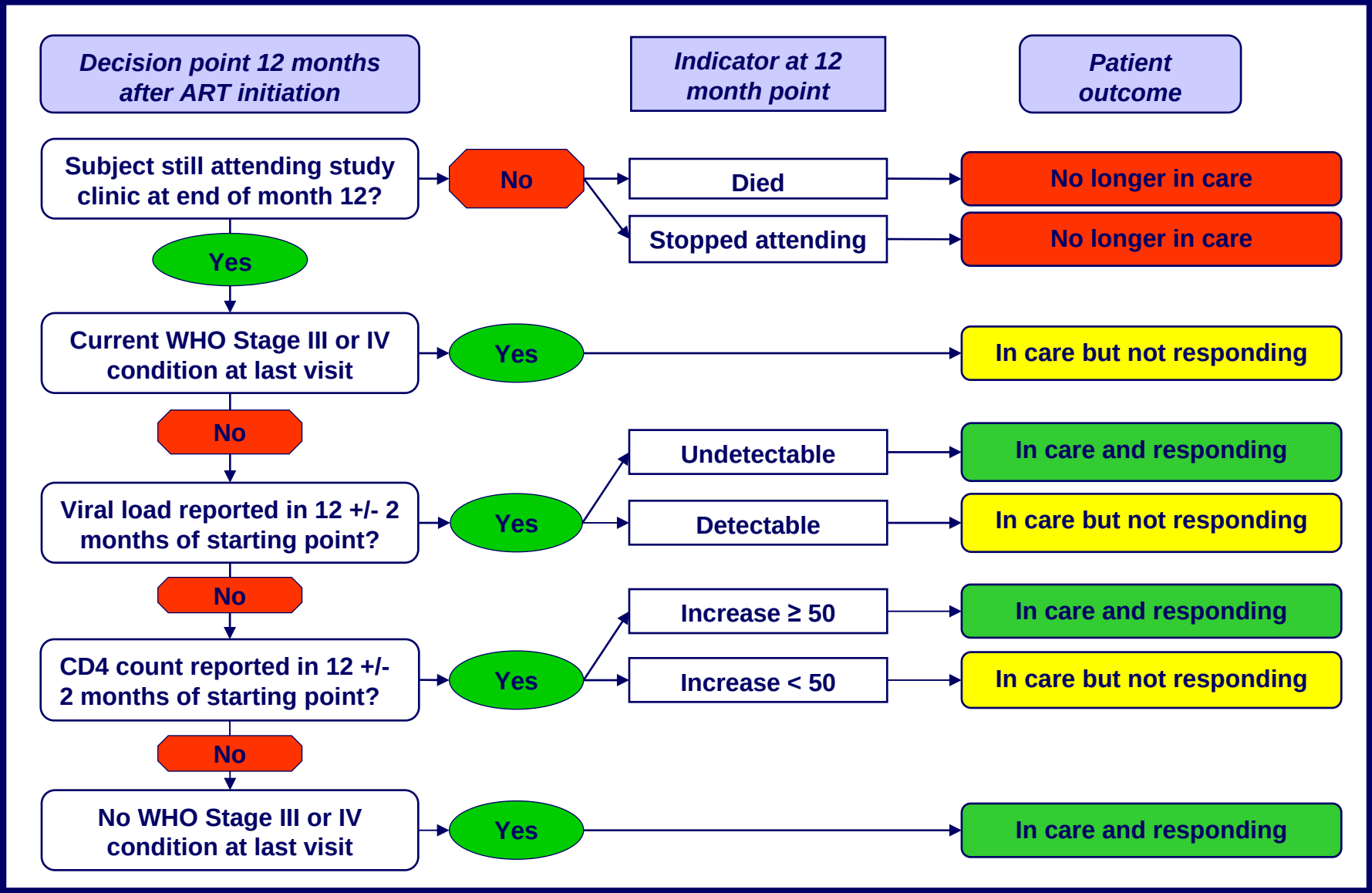
Data Analysis: Costs

- For patients remaining in care (IC and NR), all fixed and variable costs included for full 12 months following treatment initiation.
- For patients no longer in care (died or stopped attending), all variable costs included; fixed costs pro-rated until death or final visit.
- Costs estimated at 2006 prices and converted to USD at the average exchange rate in 2006 (R6.8/$1).

Data Analysis: Outcomes

- Latest diagnostic test / visit within 10 – 14 months from treatment initiation used to determine outcome
- Three outcomes categories defined:
  - **IC**: "In care and responding"
  - **NR**: "In care but not responding"
  - **NIC**: "No longer in care at initiating clinic."
- Each subject assigned to one outcome category based on existing information in medical record.

Data Analysis: Outcomes (Cont.)



Data Analysis: Cost-Outcome Ratios

Ratio	Formula
Average cost per patient treated (N)	$\frac{\text{All costs of all subjects in study}}{N = \text{all subjects in study}}$
Average cost per patient in care and responding (IC)	$\frac{\text{All costs of subjects in care and responding}}{N^{ic} = \text{only subjects in care and responding}}$
Average cost per patient in care but not responding (NR)	$\frac{\text{All costs of subjects in care but not responding}}{N^{nr} = \text{only subjects in care but not responding}}$
Average cost per patient no longer in care at study clinic (NIC)	$\frac{\text{All costs of subjects not in care}}{N^{nic} = \text{only subjects not in care}}$
Average cost to produce a patient in care and responding	$\frac{\textbf{All costs of all subjects in study}}{\textbf{N}^{ic} \textbf{ = only subjects in care and responding}}$

Sites

Site	Description	Location in South Africa	# on ART	Completed
1	Large, urban, public referral hospital	Gauteng Province	6,000	
2	Donor-funded contract between ≈ 25 private GPs and treatment NGO	Multiple	1,400	
3	NGO dedicated AIDS clinic in a rural area	Mpumalanga Province	900	
4	NGO primary care clinic in periurban area	Gauteng Province	≈ 700	
5	NGO primary care clinic in a rural area	Mpumalanga Province	647	
6	Large, regional periurban hospital	Gauteng Province	≈1,000	
7	Private, urban mission hospital	KwaZulu Natal Province	≈1,850	

Average Cost Per Outcome, Months 0-12

Outcome	Site 1 (Public hospital)	Site 2 (Private GPs)	Site 3 (Rural clinic)
All outcomes (cost/patient treated) (N)	$814	$896	$932
In care and responding (IC)	$971	$1,168*	$1,157*
In care but not responding (NR)	$1,090	$1,108	$1,113
No longer in care (NIC)	$335	$567	$368

All costs are in 2006 US dollars (R6.8=$1).
***Difference from Site 1 significant at 5% level.**

Outcomes

Outcome at month 12 +/- 2	Site 1 (Public hospital) (n=100)	Site 2 (Private GPs) (n=100)	Site 3 (Rural clinic) (n=100)
In care and responding (IC)	67 (67%)	52 (52%)	63 (63%)
In care but not responding (NR)	7 (7%)	3 (3%)	9 (9%)
No longer in care at site (NIC)	26 (26%)	45 (45%)	28 (28%)
RR [95% CI]*	1.00	0.78 [0.61-0.98]	0.94 [0.77-1.15]

***Relative risk of being in care and responding at 12 months, with Site 1 as the reference.**

Cost-Outcome Ratios

Ratios	Site 1 (Public hospital)	Site 2 (Private GPs)	Site 3 (Rural clinic)	% diff. highest-lowest
Average cost per patient treated (= all costs / all patients)	$814	$896	$932	14%
Average cost per patient in care and responding (= IC costs / IC patients)	$971	$1,168	$1,157	20%
Proportion of patients in care and responding	0.67	0.52	0.63	29%
Average cost to produce a patient in care and responding (= all costs / IC patients)	**$1,215**	**$1,723**	**$1,480**	**42%**

Breakdown of Cost Per Patient Treated

Cost	Site 1 (Public hospital)	Site 2 (Private GPs)	Site 3 (Rural clinic)	% difference highest-lowest
Drugs	$429	$500	$399	25%
Labs	$197	$74	$111	166%
Visits	$116	$79	$185	134%
Fixed costs	$72	$242	$238	236%
Total	$814	$896	$932	14%

Limitations of the Study

- Only 3 sites analyzed so far; generalizability limited.
- Sample size at each site is too small for stratification.
- Estimates are of average, not marginal, costs.
- Does not take patient differences into account.
- Excludes some potentially important costs:
  - Inpatient care
  - Care provided by other facilities (e.g. for TB)
  - Costs to patients themselves
  - Treatment programme management above the level of the individual facility or project.

Preliminary Conclusions

- Costs of ART differ by site (and presumably model), but magnitude of differences is not huge.
- Cost-effectiveness of ART can be sabotaged by high costs, large numbers of patients not remaining in care or not responding, or both.
- Once outcomes are considered, perceptions of resource investments may change (i.e., spending more might make sense).
- Treatment facility scale is likely an important determinant of costs.
- Patient characteristics are probably an important determinant of outcomes.

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