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BACKGROUND

Among the anticipated benefits of differentiated service delivery models (DSD models) for HIV treatment are a reduction in costs to both providers and patients. Although this expectation is widely held, data on resource requirements of DSD models and their costs to patients compared to the standard of care (SOC) are sparse. As part of a larger rapid review of the published and gray literature on the implementation and outcomes of DSD models since 2016, AMBIT synthesized data from the subset of sources that provide estimates of provider- and patient-level costs of DSD models.

METHODS

For the systematic review of published literature we searched PubMed, Embase and Web of Science and international HIV conferences since 2016. For the gray literature review, we used Google's advanced search to include posters, presentations, and reports from websites of DSD implementing partners and ministries of health. Sources without a patient cohort, systematic or other reviews, mathematical models, and sources that provided no information on at least one outcome (coverage, uptake, clinical outcomes, cost/resource utilization, acceptability, and feasibility) were excluded. Models focusing on pregnant women in PMTCT programs and reports about PEP or PrEP were also excluded. From these comprehensive reviews, we then identified the subset of sources that contain estimates of the costs of DSD model implementation to providers (health systems) and of the costs (time or money) of DSD model participation to patients.

RESULTS—PROVIDER COSTS

- 7 (8.2%) of 51 publications and 34 unpublished reports contained provider cost estimates.
- Only 1 of the 7 studies estimated costs empirically, with patient-level resource utilization data.
- 2 of the 7 studies estimated changes in clinic patient burden resulting from DSD implementation.
- The remaining 4 studies estimated costs based on guidelines for each DSD model, rather than on data generated during implementation.
- Only 3 studies compared DSD model costs to those of standard care.
- Results are summarized in Table 1.

RESULTS—PATIENT COSTS

- 6 sources reported patient costs, measured as travel costs and/or time spent.
- 3 of these studies provided standard of care comparisons.
- Results are summarized in Table 2.

DISCUSSION/LIMITATIONS

- We found only one study since 2016 that used patient-level data to estimate provider costs (and even that study used guideline quantities for ARV and labs tests).
- Most studies report guidelines-based estimates, perhaps a reflection of the difficulty of collecting patient-level DSD model data.
- Studies reporting resource utilization (patient burden) only, provide no information on whether patient outcomes remained the same or how providers used the freed up time.
- Very few studies compared DSD model costs to those for standard care, making it hard to determine whether the models reduce total provider or patient costs.
- Our review omitted estimates prior to 2016 and was not comprehensive for guidelines-based cost analyses.

CONCLUSIONS

- DSD models saved patients substantial amount of money on travel costs and reduced time required to receive ART.
- The limited evidence available suggests a modest reduction in resource utilization per patient, which may or may not translate into budgetary savings for the provider, and a very small decrease in provider costs.
- Full results are available at <https://sites.bu.edu/ambit/project-documents/>.
- The AMBIT team is working on cost estimates for DSD models in Zambia, Uganda, Lesotho, and South Africa. Expect results by early 2020!

TABLE 1: PROVIDER COSTS

Country	Model	Costs included				DSD (USD) cost/patient	SOC (USD) cost/patient	% cost ↓ due to DSD
		ARVs and labs	Clinic visits	DSD visits	Program costs			
Empirical costing								
Kenya ¹	Streamlined care					\$285.52		
Uganda ¹	model from the SEARCH study ⁵	✓		✓	✓	\$309.08		
Resource utilization quantification								
Nigeria ²	Multi-month scripting			Metric = patient visits/day				32%
DRC ³	Multiple models [†]			Metric = patients/provider		202	409	51%
Guidelines-based costing								
Malawi ⁴	MMS					\$121.41	\$135.33	10%
	FFT	✓	✓	✓	✓	\$120.73	\$135.33	11%
	CAG					\$122.30	\$135.33	10%
Malawi ⁵	Teen Club			✓	✓	\$30		
South Africa ⁶	Youth care clubs			✓	✓	\$48		
Tanzania ⁷	Community and facility			✓	✓	\$45	\$108	58%
	Community					\$20	\$108	81%

⁵Empirical costing for patient visits; remaining inputs relied on guidelines. Streamlined care included immediate ART initiation, patient-centered environment, clinical, phlebotomy and ART dispensing at one location, viral load monitoring with counseling, integrated NCD care, quarterly clinic visits and ART dispensing, 24-hour telephone access to the clinician, flexible clinic hours and location for dispensing, telephone appointment reminders, and patient tracking.

[†]Model includes ART support group, community-based point of ART distribution (PODI+), fast-track ART refill circuit.

[¶]Excludes costs of ARVs and laboratory tests; includes only additional services associated with DSDs. No cost year indicated.

*Monetary costs were converted into USD using the annual average exchange rate for the local currency over the last data year.

** Patients enrolled in FTR and receiving MMS.

*** Assumed minimum frequency to annualize.

TABLE 2: PATIENT COSTS

Country	Model name	DSD model		SOC	
		Travel cost (USD)	Time or distance	Travel cost (USD)	Time or distance
Facility based individual models					
Malawi ⁴	Fast track refills**	\$2.30/year	20.9 hrs/year	\$7.00/year	74.7 hrs/year
	Multi-month scripting	\$2.30/year	24.9 hrs/year	\$7.00/year	74.7 hrs/year
Out of facility based individual models					
South Africa ⁸	Centralized chronic medicines dispensing and distribution	\$1.07/visit	12.9% patients >1 hrs/travel time to pickup point		
South Africa ⁹	Community based ART pick-up points	83% reduction in travel cost/year			
Tanzania ¹⁰	ARV community delivery	\$0.40/year		\$3.30/year	
Uganda ¹¹	Community pharmacies***		9.0 waiting hrs/year		
Healthcare worker led groups					
South Africa ⁶	Youth care club***		13.8 visit hrs/year		48.0 visit hrs/year
South Africa ⁸	Adherence club	\$0.80/visit	20% of patients > 1 hr/ travel time from AC		
Client led groups					
Malawi ⁴	Community ART group	\$1.20/year	36.8 hrs/year	\$7.00/year	74.7 hrs/year

References

- Shade SB, Osmand T, Mwangwa F, Owaraganise A, Clark TD, Charlebois ED, et al. Cost of streamlined HIV care in rural Kenyan and Ugandan clinics in the SEARCH study. *Top Antivir Med* 2017;25:444s-445s
- Attah M, Mohammed A, Hassan S AF. Nigeria ARV multimonth scripting: Impact on public health service delivery, infrastructure and supply chain management systems across "high volume" ART clinics. <https://programme.aids2018.org/Abstract/Abstract/4350>
- Kamerhe D, Tendo C, Mwangwa R, Thior I, Canagasabay D, Kiluba J, et al. Impact of offering differentiated HIV care on treatment retention and health facility workload: Results from Kenya health zone in the Democratic Republic of the Congo. <http://www.abstract-archival.org/Abstract/Share/78474>
- Prust ML, Banda CK, Nyirenda R, Chimbwandira F, Kalua T, Jahn A, et al. Multi-month prescriptions, fast-track refills, and community ART groups: Results from a process evaluation in Malawi on using differentiated models of care to achieve national HIV treatment goals. *J Int AIDS Soc* 2017;20:41-50.
- Baylor International Pediatrics AIDS Initiative. Adolescent and psychosocial services: BIPAI Teen Club Model-Malawi. http://www.differentiatedcare.org/Portals/0/adam/Content/6FT3wVA2XkC69AeuuaCOaA/File/Ngoma_Country_presentation_Malawi.pdf
- Pahad S, Beery M, Martin CE, Henwood R, Dondolo E, Ngobeni M, et al. Youth Care Clubs: Optimising clinic time, fostering peer support, improving adherence. https://www.sahivsoc2018.co.za/wp-content/uploads/2018/11/22C_Moira-Beery.pdf
- Forsythe S, Lee B, Tarimo K, Silvan B, Balampama M. HIV treatment support services in Tanzania: A cost and efficiency analysis at facility and community levels. *Palladium, Health Policy Plus*. 2019. http://www.healthpolicyplus.com/hs/pubs/11310-11567_TZEfficiencyofShiftingHIVSupportServicesToC.pdf
- National Department of Health. Evaluation of the National Adherence Guidelines for chronic diseases in South Africa: patient perspectives on differentiated care models [Internet]. Washington D.C.; 2017. <http://documents.worldbank.org/curated/en/779941507667444415/pdf/120344-WP-PUBLIC-85p-add-series-SAPProcessEvaluationPatientReportFINAL.pdf>
- Roberts P. Community Based ART Pick-up Points. 2018. http://cquin.icap.columbia.edu/wp-content/uploads/2018/03/Roberts_CCMDD_Final.pdf
- Geldsetzer P, Francis JM, Sando D, Asmus G, Lema IA, Mboggo E, et al. Community delivery of antiretroviral drugs: A non-inferiority cluster-randomized pragmatic trial in Dar es Salaam, Tanzania. *PLoS Med*. 2018 Sep 1;15(9).
- Ssuuna M, Nakade S, Zalwango S, Mubiru J, Okello D, Otim L, et al. The IDI-KCCA Community Pharmacy ART Refill Program. 2018;(November):2018. Available from: <http://cquin.icap.columbia.edu/wp-content/uploads/2018/11/Community-pharmacy-poster-Infectious-Diseases-Institute-2.pdf>