Dynamic Choice HIV Prevention with Cabotegravir (Cab-LA): a model-based cost-effectiveness analysis

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SEARCH
SUSTAINABLE EAST AFRICA RESEARCH IN COMMUNITY HEALTH

BACKGROUND

There is a need to strengthen primary HIV prevention in east, central, southern and west Africa (ECSWA). In recent randomized trials in Kenya and Uganda, a dynamic choice HIV prevention (DCP) intervention that offered structured choice of biomedical prevention product and opportunity to change products over time substantially improved prevention coverage; incident HIV infections were eliminated when long-acting cabotegravir (Cab-LA) was included as an option.
Summary of DCP trials:

- DCP within antenatal care settings
- DCP within community settings
- DCP within general outpatient department settings

The potential cost-effectiveness of the regimen in ECSWA countries is currently unknown. We used an existing individual-based model (HIV Synthesis) to evaluate the estimated health effects and cost-effectiveness of DCP when scaled up across representative settings in ECSWA.

METHODS

Each model run generates a simulated population of adults with variable values on each person updated every 3 months, including primary and non-primary condomless sex partners, HIV testing, VMMC, PrEP and PEP. In HIV-positive people, we model viral load, CD4 cell count, antiretroviral drugs, adherence, and drug resistance. Through sampling of parameter values we create 1000 "setting-scenarios" reflecting uncertainty in assumptions and a range of settings similar to those seen in ECSWA (**Table 1**). For each setting scenario, we compare outcomes from 2024 between policies of

(i) Continuation of current status quo of HIV prevention interventions
(ii) Introduction of the DCP intervention with oral PrEP, PEP and condoms without Cab-LA PrEP
(iii) Introduction of the DCP intervention additionally including Cab-LA PrEP

We assumed that DCP visits would cost an additional $15 US dollars (USD) per visit, in addition to standard PrEP visit and medication costs. When considering DCP with Cab-LA, we assumed a Cab-LA drug cost of $80 USD per year.

For cost-effectiveness analysis, we used a 50-year time horizon, a willingness to pay threshold of $500 US Dollars per disability adjusted life year (DALY) averted and a discount rate of 3% per year.

Table 1 Description of setting-scenarios in 2024. Based on n = 1000 setting-scenarios.

Characteristic	**Model** (median, 90% range) (women/men; otherwise combined)
HIV prevalence (age 15-49)	14.7% (4.5% - 45.3%) / 7.7% (2.5% -24.4%)
HIV incidence (/100 person years) (age 15-49)	0.70 (0.17 – 4.05) / 0.42 (0.11 – 1.80)
Proportion of HIV positive people diagnosed	92% (83% - 97%) / 83% (72% - 93%)
Proportion of diagnosed HIV positive people on ART	96% (90% - 98%) / 95% (87% - 98%)
Of people on ART, percentage with VL < 1000	95% (84% - 98%) / 93% (81% - 97%)
Proportion of all HIV positive people with VL<1000	78% (64% - 88%)
Prevalence of HIV viral load > 1000 among all adults	2.7% (0.9% - 9.8%)

Offering structured PrEP/PEP choice for HIV prevention could reduce HIV incidence by one-third and is likely cost-effective across settings across east and southern Africa

RESULTS

Estimated effects of DCP with or without Cab-LA are shown in **Table 2**. Reflecting the trial results, **among people with a PrEP indication (i.e. having a current HIV acquisition risk) and an HIV test in the past 3 months, the median (90% range) percentage on PrEP over 10 years was 14% (4% – 43%) with the status quo, 54% (23% – 74%) with DCP without Cab-LA, and 71% (35% – 83%) with DCP including Cab-LA**. These increases in PrEP use led to HIV incidence reductions, with **rate ratio 0.89 (0.67 – 1.17) for DCP without Cab-LA and 0.64 (0.44 – 0.97) for DCP with Cab-LA**, relative to the status quo.

Across setting-scenarios, both DCP policies led to DALYs being averted: 1,300 DALYs/year (95% CI 1,400 – 1,200) and 3,700 DALYs/year (95% CI 3,400 – 4,000) for DCP with and without Cab-La, respectively, in 10 million adults. Compared with no introduction of DCP, there was a mean increase in annual discounted costs over 50 years for the policy of DCP without Cab-LA of +$8.6m (95% CI +$7.7m - +$9.4m) and the policy of DCP with Cab-LA availability of +$13.2m (95% CI $11.6m - $14.8m). Addition of Cab-LA to DCP was cost-effective (vs. DCP without Cab-LA); the incremental cost-effectiveness ratio for DCP with Cab-LA (vs. status quo) was $234 per DALY averted.

Table 2 Modelled implementation of DCP and its effects across 1000 settings scenarios.

	No DCP	**DCP**	**DCP including Cab-LA PrEP**
	Mean (90% range over setting-scenarios)		
Short-term effects (10 years)			
Proportion of women / men aged 15-49 who have tested for HIV in the past 1 year	24% (11% - 58%) 8% (4% - 36%)	25% (12% - 59%) 10% (5% - 37%)	28% (13% - 60%) 12% (5% - 38%)
Proportion of people age 15-64 with an indication for PrEP / DCP	5% (2% -18%)	5% (2% -18%)	5% (2% - 17%)
Proportion of people with a current PrEP indication who take PrEP	**4% (1% - 11%)**	**15% (6% - 25%)**	**33% (10% - 46%)**
Proportion of people aged 15-64 who take PrEP	**0.2% (0% - 1.0%)**	**0.8% (0.1% - 3.4%)**	**1.7% (0.2% - 6.6%)**
Of people with a PrEP indication and an HIV test in the past 3 months, proportion on PrEP	**14% (4% – 43%)**	**54% (23% – 74%)**	**71% (35% – 83%)**
Of people on PrEP, proportion on Cab-LA	0%	0%	77% (68% - 81%)
HIV incidence (/100 person years) (age 15-49)	**0.51 (0.12 – 2.61)**	**0.45 (0.11 – 2.38)**	**0.32 (0.09 – 1.71)**
Rate ratio vs continue with current policies	---	**0.89 (0.67 – 1.17)**	**0.64 (0.44 – 0.97)**
Percentage of HIV positive people diagnosed	90% (82% – 96%)	91% (84% – 96%)	92% (86% – 97%)
Percentage of all HIV positive people with VL<1000 copies/mL	80% (67% – 89%)	81% (68% – 89%)	82% (70% – 90%)
Prevalence of HIV viral load > 1000 copies/mL amongst all adults	2.4% (0.7% – 9.0%)	2.2% (0.7% – 8.5%)	1.9% (0.6% – 7.3%)
HIV prevalence (aged 15-49)	9.6% (2.8% – 32.5%)	9.3% (2.8% – 32.5%)	8.9% (2.7% – 30.1%)
Percentage of children born to mothers with HIV who have HIV by time of end of breastfeeding period.	6.3% (2.5% - 14.5%)	6.0% (2.4% - 14.0%)	5.8% (2.3% - 13.6%)
Long-term effects (50 years)			
Difference in number of HIV-related deaths per year+	---	-1,300 (-4,500 - +800)	-3,700 (-12,300 - +200)
Difference in DALYs per year over 50 years (compared with continuing with no DCP)+	---	-18,400 (-68,600 - +19,000)	-56,400 (-178,800 - +8,200)
Difference in annual cost over 50 years (compared with no DCP)+	---	+$8.6m (-6.1 - +32.3)	+$13.2m (-16.9 - +61.0)
Difference in net DALYs* per year over 50 years (compared with no DCP)	---	-1200 (-65,900 - +55,800)	-29,900 (-179,700 - +81,700)
Incremental cost-effectiveness ratio (cost per DALY averted)	---	Dominated	$234
Percent of setting scenarios for which given policy:			
Incurs lowest DALYs	6%	11%	83%
Has the lowest cost	69%	8%	23%
Is the cost-effective policy (i.e. lowest net DALYs)	30%	14%	56%

*90% ranges reflect both uncertainty in assumptions and variability between settings in ECSWA ; + in context of an adult population of 10 million. * based on a cost-effectiveness threshold of $500 per DALY averted.*

Dynamic Choice Prevention is cost-effective in 70% of scenarios and specifically DCP with CAB-LA in >50% of settings. Implementation of structured choice for HIV prevention and inclusion of long-acting cabotegravir could reduce incident HIV infections by one-third.

Figure Cost-effectiveness of DCP with or without Cab-LA

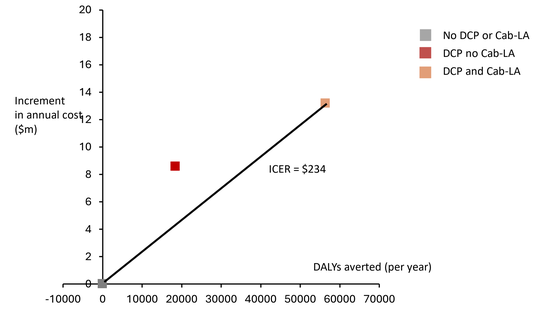

Table 3 Breakdown of costs.

Mean discounted annual costs over 50 years to 2075 / undiscounted annual costs over 5 years to 2030 ($m).

	No DCP	**DCP**	**DCP including Cab-LA PrEP**
DCP visits *	0.0 / 0.0	7.6 / 7.3	13.9 / 13.0
HIV testing	9.0 / 15.4	9.9 / 16.1	12.1 / 18.1
Oral PrEP / PEP drug	1.2 / 1.5	5.1 / 4.9	1.7 / 2.2
Cab PrEP drug	0.0 / 0.0	0.0 / 0.0	8.3 / 7.5
PrEP clinic visits	0.8 / 1.0	3.4 / 3.3	9.4 / 9.0
ART drug	51.4 / 78.9	49.0 / 79.0	42.8 / 79.0
Cotrimoxazole	4.4 / 7.1	4.2 / 7.1	3.6 / 7.1
ART clinic visits	24.0 / 38.4	22.8 / 38.5	19.7 / 38.5
Viral load tests	13.1 / 20.7	12.4 / 20.7	10.5 / 20.7
CD4 count tests	0.9 / 1.5	0.9 / 1.5	0.7 / 1.4
Clinical care costs HIV-related	14.7 / 21.6	14.0 / 21.5	12.6 / 21.2
VMMC	1.7 / 5.1	1.8 / 5.2	1.9 / 5.3
Care for children with HIV	8.8 / 14.1	7.9 / 13.5	6.2 / 12.3
Total	**130.2** / 205.3	**138.8** / 218.5	**143.5** / 235.3

* beyond costs of PrEP or HIV testing.

DISCUSSION

Effective approaches for delivering biomedical HIV prevention to meet the diverse and dynamic needs of both women and men, including in rural settings, are urgently needed. The SEARCH DCP trials have provided evidence on benefits of a choice-based person-centered model for delivering HIV prevention in real-world settings, including in the context of incorporating long-acting cabotegravir. We evaluated the potential cost-effectiveness of introduction of the DCP intervention and find that the policy of DCP with Cab-LA PrEP is likely to be a cost-effective policy choice in multiple settings, if Cab-LA can be sourced at around $80 per year or less.

CONCLUSIONS

The dynamic choice HIV prevention intervention has a high probability of being cost-effective in multiple settings should it prove possible to source long-acting cabotegravir at a sufficiently low cost.

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