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The Clinical Impact and Cost-Effectiveness of Clinic-Based Cognitive Behavioral Therapy for People with HIV, Depression, and Virologic Failure in South Africa

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An 8-session cognitive behavioral therapy intervention for adherence and depression for people with HIV, depression, and virologic failure would improve life expectancy and be cost-effective in South Africa.

BACKGROUND

- Depression affects 25–30% of people with HIV (PWH)–or approximately 750,000 PWH–in South Africa.
- Depression is associated with nonadherence to antiretroviral therapy (ART) and increased mortality.
- A recent randomized trial in South Africa found that 8 nurse-led cognitive behavioral therapy (CBT) sessions improved depression, ART adherence, and viral suppression in PWH with depression and virologic failure (Safren *et al*. *JIAS* 2021).

OBJECTIVE

- To evaluate the long-term outcomes and cost-effectiveness of 8 weekly CBT sessions for PWH with depression and virologic failure in South Africa. We compared the two trial strategies:
  1. **ETAU: "Enhanced treatment as usual"**
     - Standard-of-care nurse-led evaluation of depression with referral to the patient's HIV provider.
  2. **CBT-AD: "CBT for adherence and depression"**
     - ETAU *plus* 8 sessions of nurse-delivered CBT.

METHODS

- We used the Cost-Effectiveness of Preventing AIDS Complications (CEPAC) microsimulation model to project long-term outcomes for PWH with depression and virologic failure from trial data:
  - **ETAU:** 20% virologically suppressed at one year
  - **CBT-AD:** 32% virologically suppressed at one year
- We projected the numbers alive and suppressed at 1, 5, and 10 years with each strategy per 10,000 simulated PWH.
- We calculated incremental cost-effectiveness ratios (ICERs, $/QALY) from discounted (3%/year) QALYs and costs, defining cost-effective as an ICER ≤$2,545/QALY (0.5x the 2020 annual South Africa *per capita* GDP).
- We examined key parameters in one-way sensitivity analysis.
- In two-way sensitivity analyses, we examined the joint impacts of CBT per-session cost and improvement in viral suppression at one year for CBT-AD compared with ETAU.
- We assessed the 10-year budgetary impacts of ETAU and CBT-AD when used to treat 25% of all PWH with depression and virologic failure in South Africa.

METHODS, continued

Table 1. Select base case input parameters

Input parameter	Base case value	Source
Cohort characteristics		
Sex, female/male, %	70/30	Safren *JIAS* 2021
Age, mean (SD), years	39 (9)	Safren *JIAS* 2021
Initial CD4, mean (SD), cells/μL	214 (182)	Safren *JIAS* 2021
HIV and CBT treatment		
Proportion 1st-line/2nd-line ART, %	51/49	Safren *JIAS* 2021
48-week viral suppression, %[a]		Aboud *Lancet HIV* 2019; Walmsley *NEJM* 2013; SECOND-LINE *Lancet Lond Engl* 2013; Paton *NEJM* 2014; La Rosa *Lancet HIV* 2017
1st-line ART: TDF + 3TC + EFV	0–87	
2nd-line ART: AZT + 3TC + LPV/r	0–83	
Loss to follow-up, monthly probability	0.002–0.010	Haas *JIAS* 2018
Improvement in one-year viral suppression: CBT-AD vs. ETAU, %	12	Safren *JIAS* 2021
Quality of life		
HIV-related utilities, range by age and CD4	0.85–0.91	Resch *AIDS* 2020
Untreated depression, multiplier [b]	0.75	Tran *Int J Environ Res Public Health 2018*
Improvement with CBT (12 months), %[b]	25	
Costs (2020 USD)		
1st-line ART: TDF + 3TC + EFV, monthly	7.5	CHAI 2017
2nd-line ART: AZT + 3TC + LPV/r, monthly	22	CHAI 2017
CD4 count test/HIV RNA test	12/22	Dugdale *PLoS One* 2019
OI treatment, one-time, range by OI	177–620	Thomas 2007; Cleary *South African Health Review* 2005
HIV care, monthly, range by CD4	12–118	
CBT intervention, per session	29	Safren *JIAS* 2021

Abbreviations: CBT, cognitive behavioral therapy. [a] 48-week viral suppression depends on a predetermined ART adherence (from a user-specified distribution). [b] The improvement in quality of life associated with CBT treatment is applied for 12 months, after which patients return to the quality-of-life multiplier associated with untreated depression for life.

RESULTS

Table 2. Projected clinical and cost-effectiveness outcomes of CBT-AD compared with ETAU for people with HIV, depression, and virologic failure

	Outcomes per 10,000 PWH			Discounted [a] life expectancy		Discounted [a] lifetime costs	ICER [a,b]	
	n	*n*	*n*	*years*	*QALYs*	*2020 USD*	*$/YLS*	*$/QALY*
ETAU	*1y*	*5y*	*10y*					
Alive	8,700	4,820	2,710	6.23	4.12	6,210	--	--
Suppressed	2,030	1,890	870					
CBT-AD	*1y*	*5y*	*10y*					
Alive	8,850	5,380	3,160	6.84	4.68	6,610	660	730
Suppressed	3,200	2,120	970					

Abbreviations: CBT-AD, cognitive behavioral therapy for adherence and depression; ETAU, enhanced treatment as usual; PWH, people with HIV; ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year;. [a] Discounted at 3% per year. [b] Incremental cost-effectiveness ratios are the difference in costs divided by the difference in life years or quality-adjusted life-years.

RESULTS, continued

Figure 1. One-way sensitivity analysis: CBT-AD vs. ETAU

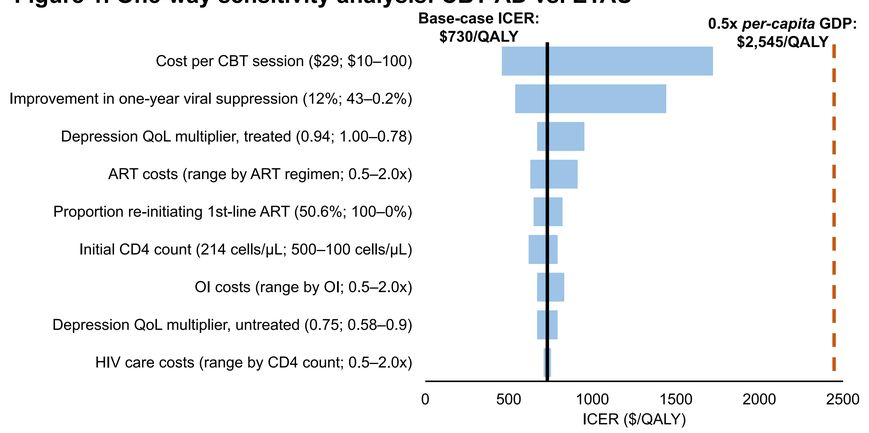


Figure 2. Two-way sensitivity analysis: CBT $/session and improvement in one-year viral suppression

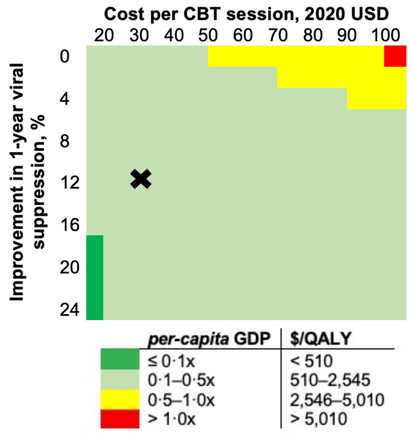
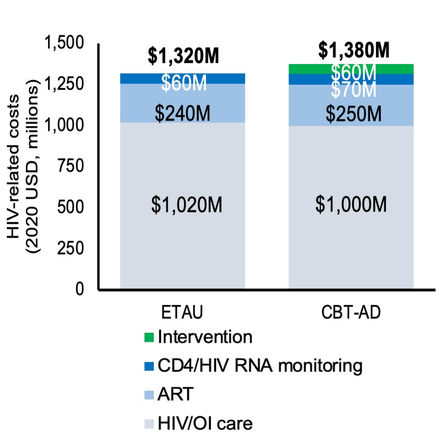


Figure 3. Budget-impact analysis: HIV-related costs of ETAU and CBT-AD over 10 years



- CBT-AD remained cost-effective compared with ETAU with wide input variation.
- The ICER would remain ≤$2,545/QALY (*0.5X per-capita* GDP) as long as CBT-AD improved one-year viral suppression by >2% and cost <$70/session.
- CBT-AD would increase HIV-related costs by $60 million over 10 years.

LIMITATIONS

- We projected long-term survival from one-year outcomes.
- We made assumptions about how ART adherence affected viral suppression because we were unable to link the two outcomes from trial data.
- We did not have data on current 1st-line ART (TLD).

CONCLUSIONS

- 8 cognitive behavioral therapy sessions for PWH with depression and virologic failure would:
  - Increase long-term virologic suppression
  - Increase life expectancy by 0.6 years
  - Be cost-effective versus status quo.
- Targeted mental health interventions should be integrated into HIV care in South Africa.

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