



Commentary

Cost-effectiveness of HIV Prevention Interventions: Estimates from Real-world Implementation Needed

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Despite important reductions in HIV-1 incidence in sub-Saharan Africa over the past decade, current projections suggest that UNAIDS epidemic control targets for 2020 will not be met [1]. The rapidly expanding toolkit of HIV-1 prevention methods – including risk and harm reduction interventions, voluntary medical male circumcision (VMMC), and antiretrovirals for treatment as prevention (TasP), prevention of mother-to-child transmission (PMTCT), and pre-exposure prophylaxis (PrEP) – arguably contains the components necessary, when delivered in combination, to curtail the epidemic substantially. However, the expansion of available HIV-1 prevention methods runs parallel to stagnating donor budgets and limited national resources to implement such methods [2]. Optimal allocation of these highly-effective methods will be key to meeting new epidemic control targets for 2030 [3]. Cost-effectiveness analyses provide a critical tool to evaluate how limited resources can best be deployed to maximize HIV-1 prevention impact.

In this issue of *EClinicalMedicine*, Sarkar et al. [4] provide valuable insight to the current understanding of the relative costs and cost-effectiveness of available HIV-1 prevention methods in sub-Saharan Africa with their systematic review comprising 60 articles across 14 countries. This collection of studies demonstrates consistency of cost-effectiveness estimates across settings and model assumptions for interventions that are currently widely implemented, including VMMC and PMTCT, thereby supporting global policy recommendations in favor of these interventions and providing important information for advocacy groups. This review also highlights that implementation strategies that

allocate resources to those at highest risk of HIV-1 infection will be most efficient, a key point particularly for higher-cost interventions such as PrEP and TasP.

The results of this review also emphasize that each estimate of cost-effectiveness must be interpreted within a given context, specific to the place, time period, population, and mix of concurrent interventions modeled. Costing models can generate widely variant estimates depending on input assumptions, making comparisons across interventions challenging if modeled differently. This challenge is particularly acute for decision-makers faced with budget prioritization decisions. Contextually-specific and comprehensive evaluations of cost-effectiveness, including importantly budget impact, are needed, yet this collection of analyses highlights the relative dearth of economic evaluations grounded in real-world implementation scenarios. In the absence of observations from real-world implementation, analyses must assume the level of demand for and uptake of a prevention product, as well as how the product will be used – assumptions that may not be mirrored as a product is rolled out, with important implications for intervention cost-effectiveness. Indeed, the single cost-effectiveness analysis in this review that revisited initial VMMC scale-up assumptions following implementation found that cost-effectiveness was poorer (\$4578 per HIV infection averted) [5] under real-world conditions than initial assumptions of meeting 80% coverage targets (\$927 per HIV infection averted) [6] due to lower-than-anticipated uptake. In a rapidly-shifting environment in which countries move forward with implementation of new biomedical prevention approaches [7], key questions of cost and efficiency remain unanswered. For example, what is the cost of “high-cost” interventions when truly delivered in real-world implementation? Can systems streamline delivery, as has been done with antiretroviral treatment, to bring efficiencies? What are the main cost drivers within a given setting, and how can implementation strategies and price negotiations be leveraged to reduce such costs? For a given country, what is the incremental cost of available interventions as they are sequentially added to the package of prevention services, and what is the optimal package within a given budget? As an intervention is scaled up, updated estimates of intervention costs and a detailed picture of product uptake and use provide the necessary parameters for contextually-specific budget impact and cost-effectiveness analyses.

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As progress in the fight against the HIV-1 epidemic continues, optimal allocation of limited resources will become increasingly important to achieve optimistic, but world-changing, prevention goals. Decision-making on the national level and allocation of both local and donor budgets will immensely benefit from concerted efforts to evaluate costs, cost-effectiveness, and budget impact of HIV-1 prevention interventions in a context-specific manner as interventions are implemented. The results of this useful systematic review should stimulate implementation researchers and policymakers to gather the right kind of real-world inputs to make cost-effectiveness models immediately relevant to the global goal of controlling the epidemic.

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