Background & Research Questions

Potential effectiveness and cost efficiencies of condomless sex targeted PrEP in KZN, South Africa: considerations of drug resistance, ART regimen and HIV testing frequency

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Method - 1

Methods - 2

Policy Options Compared

Option 1: No PrEP

Option 2: PrEP available for women aged 15-24 and female sex workers

Option 3: PrEP available all adults age 15-65

Criteria for advising to start and continue PrEP

2-1 male condomless sex partners in past 3 months or on-going condomless sex partner diagnosed with HIV but off ART

Assumptions related to PrEP

PrEP is only initiated if the individual presents for care and tests negative for HIV at the time PrEP offered. After stopping, PrEP provides residual protection against HIV infection (and again fulfills the above criteria: 90% chance if stopped PrEP due to no condomless sex, 20% chance if stopped PrEP despite condomless sex).

Distribution of adherence: 11% of people have an average adherence < 50%, 35% 50-80% and 54% >80% adherence (adherence varies within person; i.e. is randomly assigned in each 3 month period given their own distribution)

Efficacy of PrEP: 95% against non resistant virus: If partner has non resistant HIV: effectiveness is 0.95 times the protection against new HIV infection from each infected condomless partner in a 3 month period

PrEP is assumed only partially effective (50% efficacy) against a virus containing both M184V and K65R mutation but fully effective otherwise

15% of people will not consider starting PrEP even if eligible; no increases in condomless sex in the population as a result of PrEP being introduced.

Method - 3

People can receive PrEP while living with HIV either because a person uses PrEP when already infected with HIV (due to <100 sensitivity of the test or because they are in primary infection (test window period)) or because they were infected despite being on PrEP (due to sub-optimal adherence, less than 100% PrEP efficacy (against non-resistant virus or presence of PrEP drug resistance in infecting source partner))

Model output of resistance emergence for persons taking PrEP having been infected with (non-resistant) HIV*: mean (95% range) proportion with M184V by 3 months of infection: 11% (0% - 30%). For K65R (0% - 17%)

Assumption on 1st line ART regimen

Dolutegravir/3TC/TDF will be the first line ART regimen in SA from 2019 onwards

Economic analysis

Cost per year per person on PrEP ($36 for 4 HIV tests, $40 for 4 clinic visits, $60 for PrEP drug): $136.

Mean cost of clinical care per year per person on ART under care (in 2017): $312.

Economic analysis conducted from a healthcare perspective. Costs and health outcomes both discounted to present $ values at 3% per annum. Cost-effectiveness threshold of $750 is base case for South Africa. Net DALYs are DALYs adjusted for the opportunity cost of resources consumed.

Results

HIV epidemic and programmatic characteristics in 2017 (KZN, South Africa)

Predicted effects of PrEP policies on use and intermediate health outcomes

Outcome year: 2020-2027

Incorporation of ART regimen

The impact and cost effectiveness of PrEP is dependent on avoidance of use of efavirenz

Option 1: 3TC/FTC/TDF

Option 2: Boosted PI (3TC/FTC/TDF)

Increase in DALYs and costs (mean over 50 years)

No PrEP

PrEP in women aged 15-24

PrEP in people aged 15-65

Differences in net DALYs per year (50 year time horizon) compared with no PrEP according to timing of use of PrEP when at risk compared to when not at risk

Conclusions

PrEP use-concentrated amongst people and periods of risky condomless sex has the potential to be substantially impactful on HIV incidence and is likely to be cost-effective in KZN over a long time horizon.

The challenge for programmes is to achieve such concentrated PrEP use.

The impact and cost effectiveness of PrEP is dependent on avoidance of use of efavirenz in 1st regimens of people who have recently used PrEP to avoid increases in NNRTI resistance which would undermine the effects of ART

In this context, less frequent than 3-monthly testing is predicted to be marginally more cost effective than 3 monthly testing (data not shown).

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