The research article – the IMRAD structure

The following sentences were taken from a research article published in PLoS Medicine. Read each sentence and decide which section it belongs to: I (Introduction) M (Methods) R (Results) D (Discussion)

1 There has recently been increasing interest in expanding provision of antiretroviral therapy (ART) as a tool for reducing the spread of HIV in generalised epidemics in sub-Saharan Africa [1–5].

2 Figure 1 shows HIV prevalence and HIV incidence in 15- to 49- y-old males and females simulated by each of the models under the counterfactual assumption of no ART provision.

3 Literature and reports of meetings on related topics were reviewed in August 2011, and researchers who had previously developed mathematical models of the potential epidemiological impact of expanded access to ART, calibrated to the South African epidemic setting, were invited to participate in the model comparison exercise by simulating a standardised set of ART scale-up scenarios.

4 As new data are reported, the accuracy of models projecting the impact of treatment as prevention should improve, and we expect that validated and scientifically based model projections will continue to be central in understanding how ART can have the greatest impact in mitigating the global HIV epidemic.

5 The reduction in incidence increases approximately linearly with access in all models. In most models, improvements in retention in care led to greater impact of treatment on HIV incidence.

6 Twelve groups accepted the invitation to participate in the model comparison exercise.

7 The mathematical models used to simulate the impact of treatment on HIV incidence in South Africa are diverse in their structure, level of complexity, representation of the HIV transmission process and the ART intervention, and parameter choices.

8 Mathematical modelling has supplied critical insights to discussions about treatment as prevention by providing a framework for combining information about the relationship between an infected individual's viral load and HIV transmissibility [6,7], the reduction in a host's HIV viral load when on ART [8,9], and the population level contact structure over which HIV is transmitted [10,11].

9 Nearly all of the models projected declines in HIV incidence after 2012 in the absence of ART, but the magnitude of the projected natural changes between 2012 and 2050 varied widely from almost no change (Goals and Granich) to greater than 45% reduction Bendavid and Synthesis Transmission).

10 In this study we set out to test whether different models of the potential impact of treatment on new HIV infections in South Africa would make similar predictions when implementing the same intervention scenarios.

11 Starting from the number of patients on ART in mid-2011, the numbers of adults starting ART in each of the years from mid-2011 through mid-2016 was specified.

12 These percentages of transmission after ART eligibility can be compared with the percentage reduction in incidence in year 2020 (Figure 5B).

13 We hope that this study will help to characterise the models that are being used to investigate questions related to the impact of HIV treatment and enable those who rely on models for decision-making to think critically about how the assumptions underlying models affect the results.

14 In this study we seek to understand the extent to which diverse mathematical models agree on the epidemiological impact of expanded access to ART by simulating the same set of intervention scenarios across the models and focusing on standardised outputs.

The title

Work out the original title of the article. To do so read the following information and fill in the blanks:

- Providing treatment against HIV may have an impact on its prevention.
- Expanding access to antiretroviral therapy may have an impact on HIV incidence.
- Mathematical models analysed the potential impact of antiretroviral therapy.
- Mathematical models were systematically compared.
- The study was done in South Africa.

"_____ _____ as _____ **: SYSTEMATIC** _____ of

_____ _____ of the **POTENTIAL** _____ of

_____ _____ on _____ _____ in _____

_____ "

The abstract

Read the abstract of the article and put the missing verbs in the correct tense and form.

Background: Many mathematical models **(investigate)** the impact of expanding access to antiretroviral therapy (ART) on new HIV infections. Comparing results and conclusions across models **(be)** challenging because models **(address)** slightly different questions and **(report)** different outcome metrics. This study **(compare)** the predictions of several mathematical models simulating the same ART intervention programmes to determine the extent to which models **(agree)** about the epidemiological impact of expanded ART.

Methods and Findings: Twelve independent mathematical models **(evaluate)** a set of standardised ART intervention scenarios in South Africa and **(report)** a common set of outputs. Intervention scenarios systematically **(vary)** the CD4 count threshold for treatment eligibility, access to treatment, and programme retention. For a scenario in which 80% of HIV-infected individuals **start** treatment on average 1 y after their CD4 count **(drop)** below 350 cells/ml and 85% **(remain)** on treatment after 3 y, the models **projected** that HIV incidence **(be)** 35% to 54% lower 8 y after the introduction of ART, compared to a counterfactual scenario in which there **(be)** no ART. More variation **(exist)** in the estimated long-term (38 y) reductions in incidence. The impact of optimistic interventions including immediate ART initiation **(vary)** widely across models, maintaining substantial uncertainty about the theoretical prospect for elimination of HIV from the population using ART alone over the next four decades. The number of person-years of ART per infection averted over 8 y **(range)** between 5.8 and 18.7. Considering the actual scale-up of ART in South Africa, seven models **(estimate)** that current HIV incidence **(be)** 17% to 32% lower than it **would have been** in the absence of ART. Differences between model assumptions about CD4 decline and HIV transmissibility over the course of infection **(explain)** only a modest amount of the variation in model results.

Conclusions: Mathematical models evaluating the impact of ART **(vary)** substantially in structure, complexity, and parameter choices, but all **(suggest)** that ART, at high levels of access and with high adherence, **(have)** the potential to substantially reduce new HIV infections. There **(be)** broad agreement regarding the short-term epidemiologic impact of ambitious treatment scale-up, but more variation in longer term projections and in the efficiency with which treatment can reduce new infections. Differences between model predictions **could not be explained** by differences in model structure or parameterization that **(hypothesize)** to affect intervention impact.