

Situating social science enquiry in the HIV treatment as prevention era

From a mathematical modelling
perspective

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ASSHH 2013, Paris 08/07/13

Main themes

- Mathematical modelling as a useful tool
- What mathematical modelling cannot do
- Why this is a problem
- Integration of modelling and social sciences
- How?

Forum for discussion

➔ @ Universal voluntary HIV testing with immediate antiretroviral therapy as a strategy for elimination of HIV transmission: a mathematical model

Reuben M Granich, Charles F Gilks, Christopher Dye, Kevin M De Cock, Brian G Williams

Can antiretroviral therapy eliminate HIV transmission?



Lancet 2008

Rit

In *The Lancet* today, Reuben Granich and colleagues. The uncontrolled number of new HIV infections,

Treating our way out of the HIV pandemic: could we, would we, should we?



Published Online
November 26, 2008
DOI:10.1016/S0140-6736(08)61732-8
See Comment page 9

HIV prevention is easy in theory, but in practice, HIV can be eliminated if transmissibility are reduced substantially in many places, achievement of this goal has not been possible and HIV incidence is still rising. *The Lancet* today, Reuben Granich

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Modelling sexual transmission of HIV: testing the assumptions, validating the predictions

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Current Opinion in HIV and AIDS 2010, 5:269–276

Purpose of review

To discuss the role of mathematical models of sexual transmission of HIV: the methods used and their impact.

Recent findings

We use mathematical modelling of 'universal test and treat' as a case study to illustrate wider issues relevant to all modelling of sexual HIV transmission.

Summary

Mathematical models are used extensively in HIV epidemiology to deduce the logical conclusions arising from one or more sets of assumptions. Simple models lead to broad qualitative understanding, whereas complex models can encode more realistic

Moving from efficacy to effectiveness

Examining the Promise of HIV Elimination by ‘Test and Treat’ in Hyper-Endemic Settings

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Abstract

Background—It has been suggested that a new strategy for HIV prevention, “Universal Test and Treat”, whereby everyone is tested for HIV once a year and treated immediately with antiretroviral therapy (ART) if they are infected, could ‘eliminate’ the epidemic and reduce ART costs in the long-term.

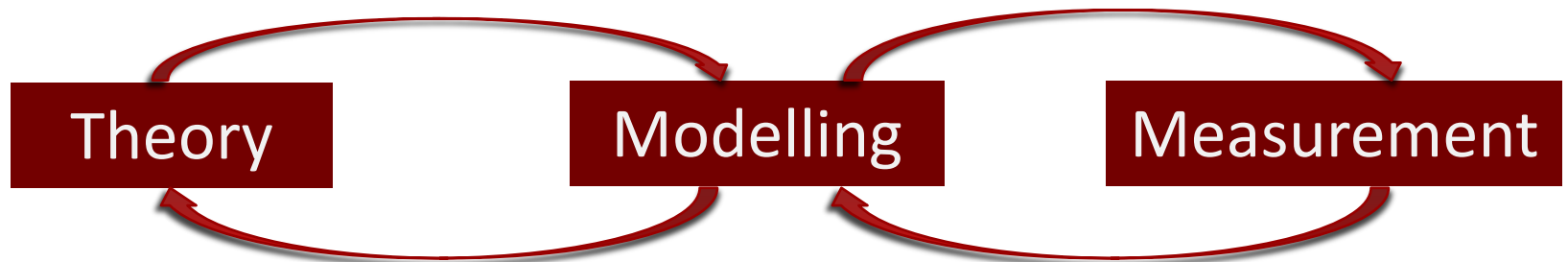
Methods—We investigated the impact of Test and Treat interventions under a variety of assumptions about the epidemic using a deterministic mathematical model.

Results—Our model shows that such an intervention can substantially reduce HIV transmission, but that impact depends crucially on the epidemiological context – in some situations less aggressive interventions achieve the same results, whilst in others the proposed intervention reduces HIV by much less. It follows that testing every year and treating immediately is not necessarily the most cost-efficient strategy. We also show that a Test and Treat intervention that does not reach full implementation or coverage could, perversely, increase long-term ART costs.

Conclusions—Interventions that prevent new infections through ART scale-up may hold substantial promise. However, as plans move forward, careful consideration should be given to the nature of the epidemic and the potential for perverse outcomes.

Identifying data needs and highlighting issues

- Unrealistic assumptions=Unrealistic expectations
 - Sexual behaviour
 - Programme effectiveness: cascade (testing, linkage, refusal, drop-out)
 - Adherence and viral suppression
 - Healthcare system and out of pocket costs



What mathematical modelling cannot do

- Cannot inform us on ethical and equitability issues
- Cannot project social responses (stigma, discrimination)

Why this is a problem: Potential consequences of TasP

- Increased inequality in infection burden between general population and key populations
- Structural issues being downplayed
- Consequences such as increased stigma and discrimination being ignored

Integration of modelling and social sciences

INPUTS

- Adherence
- Acceptability of programmes
- Reachability of specific populations

OUTPUTS

- RR key populations/general population
- Number of orphans
- Provide other benchmarks to measure impact

Potential ways forwards

- Increase dialogue and understanding between the two disciplines
- More input from social sciences to help direct the questions addressed by modelling
- Modelling could output social outcomes if these could be better quantified (in the form of DALYs...?)
- Joint publications?

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- Peter J Dodd, Geoff P Garnett, and Timothy B Hallett. Examining the Promise of HIV Elimination by ‘Test and Treat’ in Hyper-Endemic Settings *AIDS*. 2010 March 13; 24(5): 729–735.
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Model comparison

OPEN ACCESS Freely available online

PLoS MEDICINE

HIV Treatment as Prevention: Systematic Comparison of Mathematical Models of the Potential Impact of Antiretroviral Therapy on HIV Incidence in South Africa

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