



**Prioritization, coverage, and rapid scale-up are key to maximizing the impact and cost-effectiveness of pre-exposure prophylaxis (PrEP) for HIV prevention programs in Australian gay men**

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## Disclosures

Received funding from The World Bank Group, UNAIDS, and NSW Department of Health

Involved with projects funded by Gilead and MSD

No pharmaceutical grants were received in the conduct of this study

## PrEP as an intervention

- **Questions:** biomedical  $\Rightarrow$  implementation and real world
  - Population level effectiveness and cost-effectiveness
  - Role alongside other interventions
  - Risk compensation and can PrEP be used on-demand
  - Costs of roll-out, implementation, and service delivery
  - Level of surveillance and monitoring required
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## PrEP cost-effectiveness

- Modelling studies in the US, UK, and Australia have previously looked at the effectiveness and cost-effectiveness of PrEP interventions in MSM
  - Results vary depending on:
    - Coverage, adherence and population targeted
    - Assumptions around efficacy and presence of other interventions
    - Evidence at time of study
  - For Australian MSM
    - Schneider et al CID 2014;58:1027
    - PrEP was only cost-effective for MSM in serodiscordant regular partnerships using the treatment cost of Truvada
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## PrEP impact and cost-effectiveness in Australia

- In 2016 AFAO commissioned the Kirby Institute to model the cost effectiveness of PrEP
  - Informed by technical experts drawn from community, clinical and social research and other stakeholders
  - Based on ASHM 2017 PrEP clinical guidelines
    - Wright, Edwina, et al. Journal of Virus Eradication 2017;3:168–84.
  - Aimed to inform advocacy organisations, policy makers, funders, the pharmaceutical industry, the TGA and the PBAC
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## Methods

- Developed a mathematical model of population level HIV transmission
  - Included all relevant population groups, interventions, behaviours, and clinical characteristics
  - Included all current and likely HIV interventions such as PrEP
  - Estimated likely costs of PrEP use in Australia
  - Model calibrated to available epidemiological data over 2000-2015 and to reflect the HIV epidemic overall and within key populations
  - Projected various PrEP spending, coverage, implementation and behavioural scenarios to evaluate cost-effectiveness over 2016-2030
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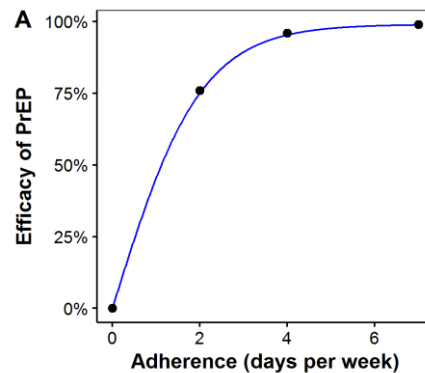
## PrEP Implementation Scenarios

- Modelled scenarios where:
  - Coverage varied from 0-90% in high-, medium-, and low-risk gay men
    - Based on ASHM guidelines
  - Time to scale-up and reach specified coverage varied from 1 to 10 years
  - Condom use reduced as PrEP scales-up:
    - In the population taking PrEP
    - In the overall population
  - Population level adherence varied from 10 to 100%
    - Measured as days PrEP taken per week
    - Adherence affects efficacy and cost
    - Generally assumed this was high (around 90%)

## PrEP model efficacy

Based on Anderson et al Science Translational Medicine 2012;4;151

- For 100% adherence, efficacy = 99%
- Different assumptions can be applied



## PrEP model costs

- Based on previous work by: *Schneider K, et al. CID 2014; 58:1027–34*
  - Updated to 2015 prices
- Overall cost of providing PrEP = number of people on PrEP x unit cost
- PrEP unit cost based on annual cost of providing Truvada as treatment + monitoring costs: \$10,249 per year
  - 100% adherence
  - PrEP on demand could be captured with a lower unit cost

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## PrEP cost-effectiveness

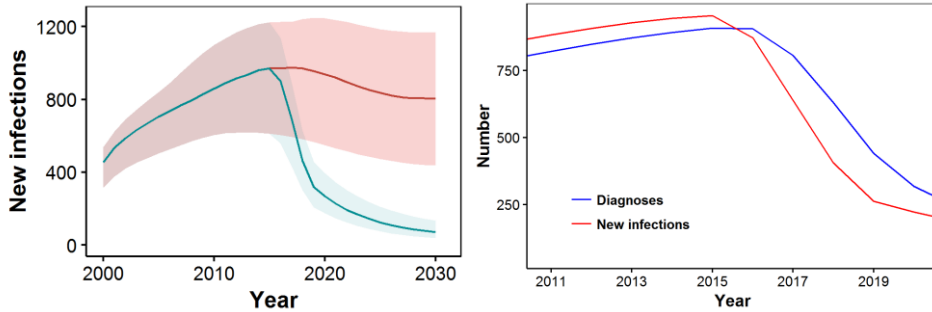
- For each scenario estimated number of new infections, new diagnoses, change in HIV prevalence (+ other things) and total cost of providing PrEP over 2016-2030
  - Calculated cost effectiveness using cost per quality adjusted life year (QALY) gained compared to a status-quo scenario (no PrEP and things stay the same)
    - QALYs gained: amount of infections, deaths and illness prevented
  - Assessed cost-effectiveness using willingness-to-pay thresholds
    - \$30,000, \$60,000, and \$90,000 per QALY gained (treatment)
    - \$10,000 to \$30,000 per QALY gained (prevention)
  - Calculated PrEP unit cost required to meet these thresholds and to be cost saving
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## What is the potential impact of PrEP?

- 90% coverage high-risk men, 3-year scale-up, 90% adherence, no reduction in condom use

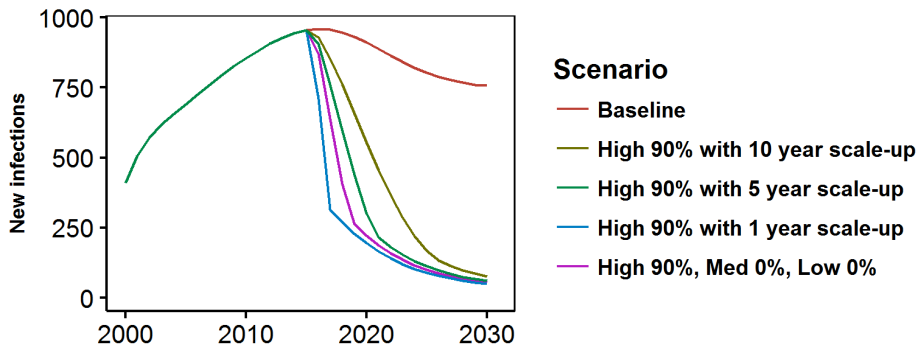
New infections and diagnoses within gay men



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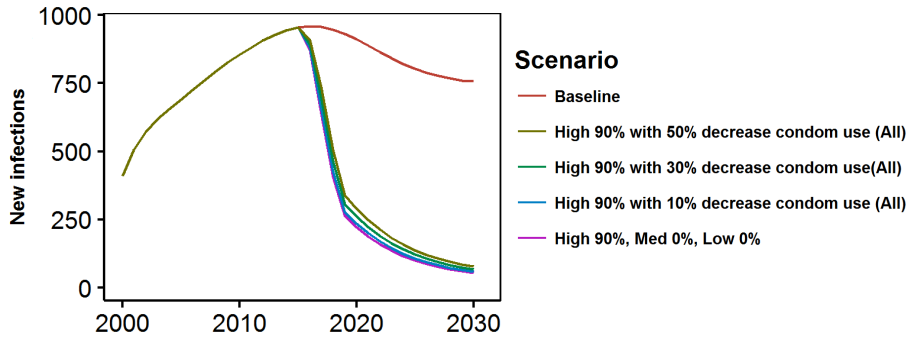
## How fast does PrEP need to be rolled out?

- 90% coverage high-risk men, 90% adherence, no reduction in condom use



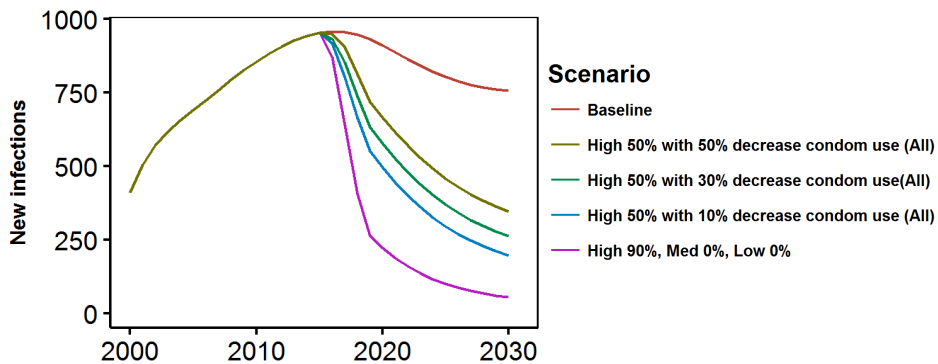
## Do we need to worry about risk compensation?

- 90% coverage high-risk men, 90% adherence, 3-year scale-up, reductions in condom use in the overall gay population
- If high coverage is reached quickly, probably not

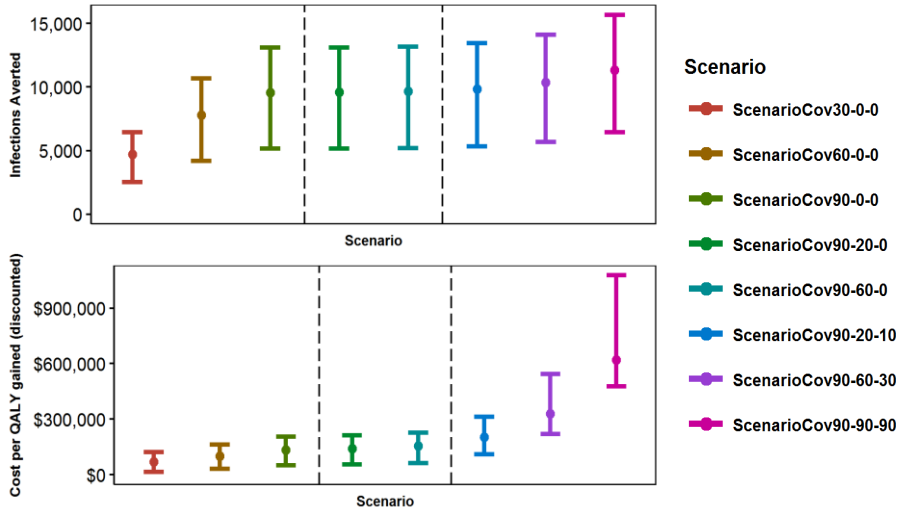


## Do we need to worry about risk compensation?

- 50% coverage high-risk men, 90% adherence, 3-year scale-up, reductions in condom use in the overall population
- If coverage is low or plateaus, maybe

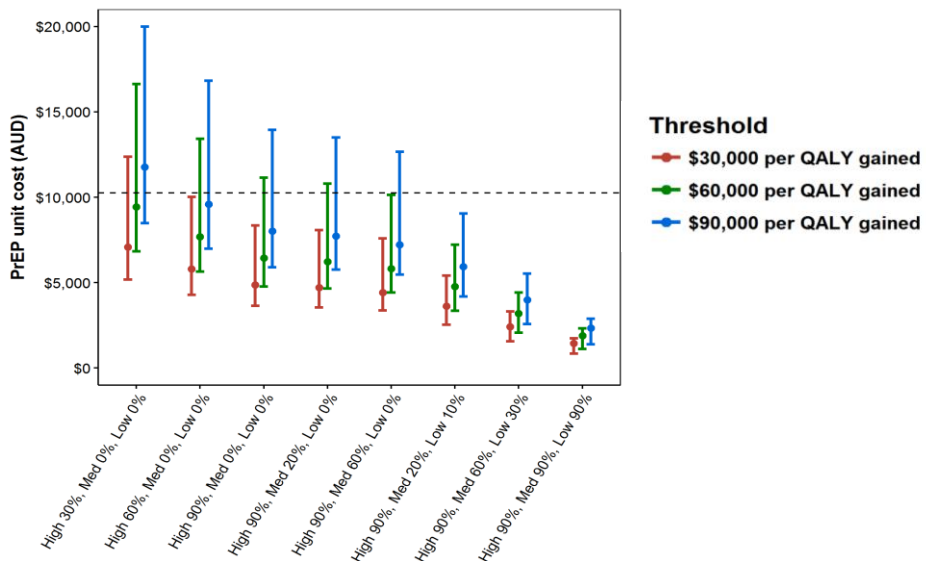


## Where should the initial focus be?



- Cumulative over 2016-2030

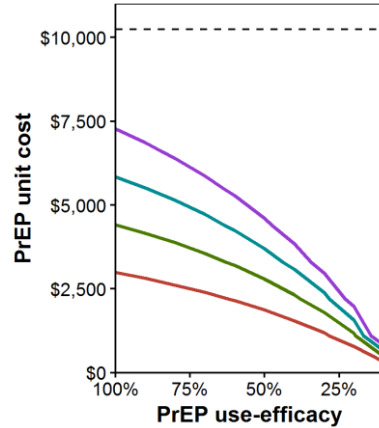
## How much should PrEP cost?





## How much should PrEP cost?

- 90% coverage high-risk men, 3-year scale-up



— \$90,000 per QALY gained   
 — \$60,000 per QALY gained  
— \$30,000 per QALY gained   
 — Cost-saving

## Summary of results

- Given PrEP to high-risk gay men could have a large impact
- Expanding PrEP access beyond high-risk gay men does not achieve substantial gains
- At current prices PrEP would need to be 40-60% cheaper for it to be cost-effective
- The faster the roll-out the bigger the impact
- Risk compensation is not a worry if coverage and adherence (and efficacy) is high
- Impact may not be seen in diagnoses for a couple of years

## Acknowledgements

- Iryna Zablotska, Andrew Grulich, David P Wilson, Rebecca Guy, Martin Holt, Garrett Prestage
  - Darryl O'Donnell, Christine Selvey, Mark Stoove, Levinia Crooks Edwina Wright, Darren Russell, Carol El-Hayek, Aaron Cogle, Heath Paynter, Bill Whittaker
  - Andrew Shattock, Cliff Kerr, Robyn Stuart
  - AFAO
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