Appendum - Discussion paper: Estimates of the number of people eligible for PrEP in Australia, and related cost-effectiveness.

Kirby Institute and the Centre for Social Research in Health

UNSW Sydney

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Prepared in response to questions from PBAC after the deferral of decision regarding the use of tenofovir with emtricitabine for HIV Pre-exposure Prophylaxis (PrEP) at the July 2017 meeting

INTRODUCTION

This addendum provides additional PrEP cost-effectiveness model scenarios requested by PBAC at a meeting at the Kirby Institute held on Monday 4 September.

In summary, these additional scenarios address the following issues:

1. PrEP coverage scenarios in which no low risk gay men use PrEP, and 40-80% of high risk gay men receive PrEP (Table 1).
2. Willingness to pay ICER thresholds varied across a range of $10,000 to $30,000 per QALY gained to reflect the fact that PrEP is a prevention strategy.

Results are shown in Tables 2-4 and Figure 1.

The Kirby institute was also asked by PBAC to comment on the possibility of changes in the high and medium risk population of gay men over time following PrEP introduction. Some information on this question can be derived from the Gay Community Periodic Surveys (GCPS), which are repeated cross-sectional surveys of HIV risk behaviours conducted regularly in most Australian states, and coordinated by the Centre for Social Research in Health and the Kirby Institute at UNSW.

Between 2016 and 2017 there was substantial PrEP roll-out in Victoria and New South Wales, with more than 10,000 gay men now estimated to be currently receiving PrEP through implementation studies in those two states. Unpublished data from the 2017 GCPS in Sydney and Melbourne showed that the proportion of gay men who reported receptive condomless anal intercourse with casual partners increased from approximately 18% in 2016 to approximately 25% in 2017, suggesting an increase in the population who would be PrEP-eligible (receptive condomless anal intercourse with casual partners is the most commonly-reported PREP eligibility criteria). Longer term trends in the proportion of gay men who would be PrEP eligible are uncertain.

ADDITIONAL SCENARIOS

Table 1: Additional PrEP usage scenarios. For each scenario, we assumed a 3-year scale-up to reach the specified coverage, 90% adherence, and there was no change in the trends for sexual behaviour or the proportion of gay men eligible for PrEP.

PrEP usage scenarios	Percentage of high risk gay men who receive PrEP (approximately 28% of gay men)	Percentage of medium risk gay men who receive PrEP (approximately 4% of gay men)	Percentage of all other gay men who receive PrEP. (approximately 68% of gay men)	Scenario name
40% uptake in high and medium risk	40%	40%	0%	Scenario40-40-0
50% uptake in high and medium risk	50%	50%	0%	Scenario50-50-0
60% uptake in high and medium risk	60%	60%	0%	Scenario60-60-0
70% uptake in high and medium risk	70%	70%	0%	Scenario70-70-0
80% uptake in high and medium risk	80%	80%	0%	Scenario80-80-0

RESULTS

Table 2: Total number of person-years of PrEP use each year. Median and range for the 50 model simulations for the number of person-years HIV-negative gay men take PrEP each year accounting for coverage, adherence (90%), a 3-year scale-up to reach the specified coverage, and population growth.

PrEP usage scenario	2016	2017	2018	2019	2020	2021
Scenario40-40-0	1,850 (1,150- 2,680)	5,120 (3,000- 7,360)	8,470 (4,920-12,200)	10,620 (6,160-15,290)	10,830 (6,290-15,580)	11,050 (6,420-15,880)
Scenario50-50-0	2,200 (1,340- 3,170)	6,330 (3,700- 9,100)	10,580 (6,140-15,230)	13,330 (7,730-19,170)	13,610 (7,910-19,560)	13,910 (8,090-19,970)
Scenario60-60-0	2,540 (1,540- 3,650)	7,540 (4,400-10,830)	12,700 (7,370-18,270)	16,050 (9,310-23,070)	16,420 (9,540-23,570)	16,810 (9,780-24,090)
Scenario70-70-0	2,890 (1,740- 4,140)	8,750 (5,100-12,570)	14,830 (8,610-21,320)	18,790 (10,900-27,000)	19,260 (11,190-27,620)	19,730 (11,480-28,250)
Scenario80-80-0	3,240 (1,930- 4,630)	9,960 (5,800-14,310)	16,960 (9,840-24,380)	21,550 (12,510-30,940)	22,110 (12,850-31,680)	22,680 (13,200-32,430)

Table 3: Results for additional PrEP scale-up scenarios. Median and range for the 50 model simulations. Incremental costs are calculated by subtracting the cumulative costs for the baseline scenario from the cumulative costs for each scenario over 2016-2030. Negative values correspond to the specified scenario having lower costs than the baseline scenario. Costs in A$ and discounted by 5%. All values rounded to the nearest 10.

Scenario	Infections averted (undiscounted)	QALYs gained (discounted)	Incremental PrEP costs (discounted)	Incremental ART costs (discounted)	Incremental cost (discounted)	Cost per QALY gained
Scenario40-40-0	6060 (3210-8220)	2880 (1520-3710)	$459,856,850 ($264,774,160-$660,693,550)	-$176,652,820 ($-229,031,330-$-90,980,310)	$285,740,950 ($122,609,500-$465,271,670)	$104,330 ($33,140-$159,940)
Scenario50-50-0	7090 (3760-9620)	3430 (1820-4430)	$587,380,710 ($339,155,480-$842,001,180)	$-211,892,760 ($-273,875,190-$-109,852,610)	$376,715,130 ($174,955,080-$607,838,740)	$115,730 ($39,520-$174,940)
Scenario60-60-0	7940 (4220-10800)	3920 (2090-5060)	$716,328,290 ($414,415,250-$1,024,981,310)	$-243,093,220 ($-313,552,240-$-126,913,310)	$472,352,900 ($233,588,500-$756,250,330)	$127,550 ($46,130-$190,310)
Scenario70-70-0	8650 (4600-11770)	4340 (2330-5620)	$846,425,000 ($490,395,600-$1,209,335,210)	$-270,930,190 ($-348,736,650-$-142,365,540)	$572,002,020 ($297,674,480-$909,680,710)	$139,960 ($52,960-$206,010)
Scenario80-80-0	9230 (4930-12560)	4720 (2540-6110)	$977,466,180 ($566,975,350-$1,394,839,930)	$-295,836,650 ($-380,031,310-$-156,392,390)	$675,112,680 ($366,471,200-$1,067,440,340)	$152,650 ($59,990-$222,010)

Table 4: PrEP unit cost required for scenario to be cost-effective for a given willingness-to-pay threshold (A$ per QALY gained). For each scenario and cost-effectiveness threshold, the table shows the median value and range (minimum and maximum) from the 50 model simulations. All values rounded to the nearest 10.

Scenario	$10,000 per QALY gained	$15,000 per QALY gained	$20,000 per QALY gained	$25,000 per QALY gained	$30,000 per QALY gained
Scenario40-40-0	$4,450 ($3,350-$7,630)	$4,760 ($3,600-$8,200)	$5,060 ($3,840-$8,770)	$5,370 ($4,080-$9,330)	$5,680 ($4,320-$9,900)
Scenario50-50-0	$4,180 ($3,160-$7,150)	$4,470 ($3,380-$7,670)	$4,760 ($3,610-$8,200)	$5,040 ($3,840-$8,730)	$5,330 ($4,060-$9,250)
Scenario60-60-0	$3,940 ($2,980-$6,710)	$4,210 ($3,190-$7,200)	$4,480 ($3,400-$7,690)	$4,750 ($3,620-$8,180)	$5,020 ($3,830-$8,680)
Scenario70-70-0	$3,720 ($2,820-$6,320)	$3,970 ($3,020-$6,780)	$4,220 ($3,220-$7,230)	$4,470 ($3,420-$7,690)	$4,720 ($3,620-$8,150)
Scenario80-80-0	$3,510 ($2,670-$5,960)	$3,750 ($2,860-$6,390)	$3,990 ($3,050-$6,820)	$4,220 ($3,230-$7,250)	$4,460 ($3,420-$7,680)

Figure 1: PrEP unit cost required for each usage scenario to be cost-effective for a given willingness-to-pay threshold (A$ per QALY gained). For each scenario, the points correspond to the median value with the error bar range corresponding to the minimum and maximum from the 50 model simulations.