

Victorian guidelines for post-exposure prophylaxis following non-occupational exposure to HIV

Victorian NPEP Guidelines 2016



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Introduction

HIV post-exposure prophylaxis (PEP) is the prescription of one or more antiretroviral drugs to reduce the risk of transmission of the human immunodeficiency virus (HIV) following a known or possible exposure to HIV. Non-occupational post-exposure prophylaxis (NPEP) refers to the prescription of PEP outside the healthcare setting and is principally provided for individuals who are at risk of HIV infection following a recent sexual or injecting drug use exposure.

These guidelines update the previous 2013 Victorian NPEP guidelines, and reflect the changes made in the updated Australian National Guidelines for PEP after non-occupational and occupational exposure to HIV (2016). The national guidelines are supported by a literature review and other documents, all of which are located at <http://www.ashm.org.au/pep-guidelines>. [1]

These guidelines particularly update:

- 1) Transmission risk with source viral load (VL) undetectable – PEP no longer routinely recommended
- 2) Recommendations for PEP – dolutegravir now recommended 3rd drug
- 3) Continuation of PEP after subsequent risk exposures – continue 28 days after last exposure
- 4) PEP in the context of PrEP

Estimated transmission risks

There are now a number of prospective studies that estimate per contact probability of HIV transmission, however they are predominantly in heterosexuals. [2] Data are limited about the per contact probability of HIV transmission in men who have sex with men (MSM); there are only 2 prospective cohorts that address HIV transmission via anal intercourse in MSM. [3, 4] A meta-analysis by Baggeley et al that included only one of these prospective studies estimated the per contact probability of HIV transmission by receptive anal intercourse (RAI) as 1.4% (1/71). [5] This is exactly the same as that estimated by the HIM cohort (and not included in meta analysis) at 1.43%. [4] This study also reported a reduction in risk when withdrawal occurred prior to ejaculation. Data from these studies have been used to create the risk estimates in the table below, however it is important to recognise that these data come from studies with different study designs, from different countries and different at-risk populations.

Whilst these risk estimates are important at a population health level, they do not adequately estimate an individual's risk after a single exposure. HIV transmission may be increased by numerous factors including viral load of the source, sexually transmitted infections (STI), breaches in mucosal barriers and circumcision status (see co-factors related to HIV transmission below). In addition, there is considerable genetic heterogeneity between individuals which affects HIV infectiousness and susceptibility.

Co-factors related to transmission

Source viral load

There is now strong evidence that indicates significant reduction in risk of HIV transmission in both heterosexuals and MSM when the source viral load is undetectable.

The HIV Prevention Trials Network (HPTN) 052 Study reported a 96% reduction in sexual transmission with early initiation of antiretroviral therapy.[6] Therefore the transmission risk for vaginal intercourse with an HIV positive partner with an undetectable viral load may be estimated to be decreased by a factor of 20. Of note, this decreased transmission risk occurred in a clinical research study where the study's HIV serodiscordant couples were routinely encouraged to practice safe sex and have regular STI testing at study visits.

More recently, results from the PARTNER Study have been published.[7] This study assessed HIV transmission risk in HIV serodifferent couples engaging in sex without condoms. During the study period (2010-2014) there were no linked transmissions from approximately 58,000 acts of condomless sex (22,000 MSM, 36,000 heterosexual). This now provides evidence that transmission risk is significantly reduced in the setting of anal sex. However, due to small numbers reporting anal sex, the upper 95% confidence interval for anal sex was estimated at 0.7 per 100 couple years (or 1 transmission in 142 years), and for MSM having condomless receptive anal intercourse with ejaculation, the upper limit risk estimate was 2.7 per 100 couple years (or 1 per 37 years) of follow up. Longer periods of follow up are required to produce more precise estimates. Similar results have been observed in the Opposites Attract which is ongoing in Australia.[8]

Circumcision status

The HIM cohort is the first prospective study to estimate the per-contact transmission risk of insertive anal intercourse (IAI). In a small subset of men who practised almost exclusive IAI, the per-contact probability of IAI was 0.11% if the insertive partner was circumcised, and 0.62% when not circumcised. A Cochrane review reported a 73% (95% CI of RRR 56-83%) relative risk reduction of circumcision in men who mainly report the insertive role in anal intercourse.[9] This was calculated from observational studies only as there have been no randomised controlled trials (RCTs) in MSM. In heterosexual men the relative risk reduction of circumcision has been calculated at 50% in a systematic review of randomised trials.[10]

Other factors

Other factors that may increase the risk of HIV transmission include:

- Sexually transmissible infection in the source or exposed individual, especially genital ulcer disease and symptomatic gonococcal infections
- A breach in genital mucosal integrity (e.g. trauma, genital piercing or genital tract infection)
- A breach in oral mucosal integrity when performing oral sex

HIV transmission risk

$$\begin{array}{c} \text{Risk of HIV transmission} \\ = \\ \text{Risk per exposure} \\ \times \\ \text{Risk of source being HIV positive} \end{array}$$

Ideally, active attempts should be made to contact the source and ask them to have an urgent HIV test, however the often anonymous nature of exposures makes this impractical.

If the source discloses they are HIV positive, consent should be gained to seek treatment details from their doctor. At the very least it is useful to know if they are on treatment or not and if their viral load is undetectable.

If the source cannot be contacted, seroprevalence data (see Table 1) will assist in determining the risk of HIV transmission and the need for PEP.

Table 1: HIV seroprevalence in Australian populations

Community group	HIV seroprevalence %
MSM Melbourne[11]	9.6
People who inject drugs in Australia[12] <ul style="list-style-type: none"> • Male homosexual • If gay and bisexual men excluded 	Overall 1-2 Up to 30 <1
Heterosexuals in Australia[12] <ul style="list-style-type: none"> • Blood donors (%donations) • STI clinic attendees 	0.0003 <0.5
Commercial sex workers (Australia)[13]	<0.1

HIV seroprevalence in overseas populations

The seroprevalence overseas varies widely, not only between countries but also in different risk groups. Highest seroprevalence is in Southern Africa (up to 25%) and in injecting drug users in South East Asia (up to 40% in Thailand). For seroprevalence for individual countries go to

<http://www.unaids.org/en/dataanalysis/datatools/aidsinfo/>

Evidence for use of PEP and number of drugs

PEP is now widely used for non-occupational exposure despite no RCTs demonstrating its efficacy. Evidence for use has been extrapolated from animal data, mother to child transmission and occupational exposure. Ultimately, the decision to prescribe PEP needs to be made on a case by case basis.

The recommendation for the number of drugs is based on the estimated risk of exposure. In the treatment of HIV, triple combination therapy provides superior viral suppression to dual combination therapy and has been the basis for the recommendation of 3 drugs for prevention following higher risk exposures.[14] However, there is no evidence to support greater efficacy of 3 drugs over 2 in the setting of post-exposure prophylaxis. In the prevention of mother to child transmission, the NICHD-HPTN 040/PACTG 1043 study demonstrated superior efficacy of 2 or 3 drugs over zidovudine monotherapy, however no difference was seen between 2 and 3 drugs. This is the basis for the recommendation of 2 drugs (rather than 3) for post-exposure prophylaxis for newborns in this setting.[15] In addition, both toxicity and discontinuation rates are higher for 3-drug versus 2-drug PEP regimens, and modelling studies have shown that under many conditions the benefits of completing a better-tolerated, 2-drug PEP regimen may exceed the benefits of a poorly tolerated 3-drug PEP regimen.[16]

- ***Three drugs are recommended for those exposed to a source with known HIV infection who is not on treatment, or is on treatment with detectable viral load.***
- ***When the source has undetectable viral load, PEP is not recommended, regardless of the nature of the exposure.***
- ***See tables 2 and 3 below for recommendations.***

Table 2: PEP recommendations for exposure to an HIV positive source

Type of exposure with a known HIV positive source	Estimated risk of transmission per exposure if source NOT on antiretroviral therapy	PEP recommendation	
		Source not on treatment or on treatment with detectable VL	Source VL undetectable
Receptive anal intercourse -ejaculation -withdrawal	1/70 1/155	3 drugs	Not recommended*
Contaminated injecting equipment	1/125	3 drugs	Not recommended*
Insertive anal intercourse (uncircumcised)	1/160	3 drugs	Not recommended*
Insertive anal intercourse (circumcised)	1/900	3 drugs	Not recommended*
Receptive vaginal intercourse	1/1250	3 drugs	Not recommended*
Insertive vaginal intercourse	1/2500	3 drugs	Not recommended*
Receptive or insertive oral intercourse	Not measurable	Not recommended†	Not recommended*
Mucous membrane and non-intact skin exposure	≤ 1/1000	3 drugs	Not recommended*

*Provided source is compliant with medication, attends regular follow up and has no intercurrent STI

†PEP (2 drugs) may be recommended for receptive oral intercourse with ejaculation if the exposed person has a breach in their oral mucous membrane

Table 3: PEP recommendations for exposure to a source of unknown HIV status

Exposure where source HIV status unknown	Estimated risk of HIV transmission per exposure	PEP recommendation
Receptive anal intercourse -ejaculation -withdrawal	1/700* 1/1550*	2** drugs if source MSM or from high prevalence country
Contaminated injecting equipment	1/12,500† (1/1250 – 1/415‡ if source MSM)	2 drugs if source MSM or from high prevalence country
Insertive anal intercourse -uncircumcised	1/1600*	2 drugs
Insertive anal intercourse -circumcised	1/9000*	Consider 2 drugs if STI, trauma or blood
Receptive vaginal intercourse	1/1,250,000^	Not recommended (Consider 2 drugs if source MSM or from high prevalence country)
Insertive vaginal intercourse	1/2,500,000^	Not recommended (Consider 2 drugs if source from high prevalence country)
Receptive or insertive oral intercourse	Not measurable	Not recommended
Mucous membrane and non-intact skin exposure	≤ 1/10,000* (MSM exposure)	Not recommended
Needlestick injury from a discarded needle in community	Not measurable	Not recommended

* based on estimated seroprevalence of 10% (9.6%) in MSM

† based on estimated seroprevalence of 1.0%

‡ based on estimated seroprevalence of 29%

^ based on estimated seroprevalence of 0.1%

**2 drugs continue to be recommended despite a new risk estimate for RAI that is higher than the risk estimates for some exposures where 3 drugs are recommended. Risk estimate figures may not always correlate directly with number of drugs recommended

Whilst these risk estimates are important at a population health level, they do not adequately estimate an individual's risk after a single exposure. In particular, when HIV prevalence data is used to calculate a risk estimate for an unknown source, **the figures above cannot be used to adequately assess an individual's risk**. For such an exposure, the risk is either that if the source was positive, or zero (if the source is not HIV infected).

Recommended PEP regimens

The most commonly prescribed 2-drug PEP regimen is the combination of tenofovir and emtricitabine, co-formulated as Truvada, however the use of generic drugs may be used to reduce cost. The VNPEPS currently recommends the use of tenofovir disoproxil fumarate and generic lamivudine.

When a 3rd drug is recommended, drugs that act prior to integration of HIV into target cells may be more appropriate for use as PEP.[17] The VNPEPS recommends the integrase inhibitor dolutegravir as the third PEP drug as it is dosed once daily, compared with twice daily dosing of raltegravir.

There are very few drug interactions with dolutegravir, however drugs that are contraindicated or should be used with caution are listed below:[18]

Drugs that are contraindicated:

- dofetilide (anti arrhythmic only available in Australia by special access)

Drugs that should be used with caution

- phenytoin, phenobarbitol, carbamazepine, rifampicin and St John's Wort.

These drugs lower or have the potential to lower dolutegravir concentrations. It is recommended to use raltegravir as the third drug if the concurrent medication cannot be ceased whilst taking PEP.

- Antacids containing polyvalent cations (Mg or Al) and products containing calcium or iron should be taken 2 hours before or 6 hours after dolutegravir.
- Metformin – increase monitoring of glucose control. Maximum recommended dose of metformin 1000mg.

Prescribing PEP

Time to initiation

- PEP should be initiated as soon as possible after exposure
- PEP should NOT be offered more than 72 hours after exposure

Duration of treatment

- The recommended duration of treatment is 28 days

Testing

- HIV antibody testing must be done at baseline and again at 6 weeks and 12 weeks post exposure
- STI screen (rectal swab, first pass urine and pharyngeal swab for chlamydia and gonorrhoea PCR) should be performed at baseline. If this is not performed at baseline, then it should be done at the next follow up visit.
- HAV, HBV and HCV serology should be performed at baseline. HAV and HBV may be omitted if the individual is known to be immune.
- Syphilis testing should be performed at baseline and repeated at 6 weeks
- HCV testing is recommended at 12 weeks if appropriate

Management (both immediate and ongoing follow-up) of an individual with known or suspected exposure to HIV is available via the ASHM website at <http://www.ashm.org.au/pep-guidelines> and is also summarised below.

Immediate management of an individual with known or suspected exposure to HIV

- Do not douche the vagina or rectum after sexual exposure
- After oral exposure, spit out blood/body fluids and rinse mouth with water
- Wounds and skin sites that have been in contact with blood or body fluids should be washed with non-caustic skin wash
- Do not inject antiseptics or disinfectants into wounds
- Irrigate mucous membranes and eyes (remove contact lenses) with water or saline

Clinical assessment and follow-up

The following details should be documented in the patient's history:

- 1. The date and time of the assessment and first dose, if prescribed**
- 2. Details of the exposure (when, with whom, what, and where?)**
 - a. date and time of exposure
 - b. details of source
 - c. exact mode and details of exposure (including contributory factors), blood or body fluid involved, trauma, first aid measures applied
 - d. place of exposure
- 3. Information about the exposed person**
 - a. most recent HIV test and result
 - b. potential exposures within the last 3 months (and earlier as indicated)
 - c. previous post-exposure prophylaxis and history of this treatment
 - d. evaluation of current STIs, HBV and HCV infection
 - e. pregnancy risk, contraception and lactation, consider emergency contraception
 - f. medical history, all medications and drug allergies
 - g. psychiatric history
 - h. drug and alcohol history
 - i. their knowledge of the source (if unavailable for interview)
- 4. Information about the source**
 - a. HIV status and other relevant demographic features
 - b. if HIV positive:
 - i. plasma viral load and CD4 count
 - ii. antiretroviral treatment history (has resistance been an issue, if so with which drugs?)
 - iii. recent HIV resistance genotyping
 - c. current or past STIs; hepatitis B and C status
- 5. PEP discussion**

An explanation of PEP and its indications and effectiveness, risks and benefits are provided to all potential candidates. Discussion of HIV, including risk assessment, is part of clinical assessment (see 2011 National HIV testing policy¹⁰). <http://testingportal.ashm.org.au/hiv>
- 6. Follow-up**
 - a. Individuals found to be HIV positive or indeterminate on baseline testing, or during follow-up, require immediate referral to an HIV specialist. PEP should be ceased if the baseline test is positive.
 - b. Individuals with serology consistent with chronic/active HBV and on a regimen containing lamivudine, tenofovir or emtricitabine should have LFTs at baseline and LFTs should be monitored for 3 months after ceasing PEP. Advice from a specialist in the management of viral hepatitis should be sought.

Laboratory evaluations and follow-up

Table 4 outlines the recommended laboratory evaluations for a person who receives PEP and is adapted from the DHHS guidelines.[14]

Current NPEP regimens are well tolerated with minimal toxicity and the utility of performing baseline investigations routinely in a generally healthy young adult population is questionable. However, while tenofovir containing combinations are the preferred first line NPEP regimen, baseline testing of renal function should be performed where there is known renal impairment, or for individuals with hypertension, diabetes, cardiovascular disease, or those on nephrotoxic agents. Tenofovir dosing adjustments need to be made if the eGFR is <60. This should be done in consultation with an HIV specialist

Table 4: Recommended laboratory evaluations for the exposed individuals

Adapted from the 2005 DHHS guidelines.[14]

Test	Baseline	Week 1 after exposure	Week 6 after exposure	Week 12 after exposure
HIV antibody	√		√	√
Hepatitis A serology ¹	√			
Hepatitis B serology ²	√			
Hepatitis C serology ³	√			√ ³
Syphilis serology	√		√ ⁴	
STI screen	√ ⁵	√ ⁵		
U&E	√			
Pregnancy test ⁶	√ ⁶			

¹MSM who have negative hepatitis A serology should be immunised.

² Individuals screened for hepatitis B may be a) immune and require no further follow-up b) non-immune and require immunisation and follow-up or c) chronically infected and require appropriate management.

³ Test for hepatitis C up to 6 months where the exposure was high risk for hepatitis C (e.g. involved injecting drug use or sexual exposure which may have involved mucosal trauma including fisting).

⁴ Repeat syphilis serology after sexual exposure.

⁵ STI screen should be done either at baseline or the first follow up visit. For MSM this consists of rectal swab, first pass urine (FPU) and pharyngeal swab for chlamydia and gonorrhoea PCR.

⁶ Perform at baseline in women of reproductive age and whenever clinically indicated during the follow up period.

Other PEP issues

Repeat PEP presenters

Among most MSM presenting for and receiving PEP, high HIV-risk sexual behaviour is not a chronic pattern but rather, appears to occur periodically or as a one-off experience in response to co-occurring personal, social or environmental factors at that particular time. However, a small minority of MSM receiving PEP present with repeated high HIV-risk sexual behaviour.

- Each presentation should be assessed on its merits and PEP prescribed if risk assessment indicates high risk exposure to HIV.
- Pre-exposure prophylaxis (PrEP) should be considered for anyone who has multiple presentations for NPEP.

Patients who have further exposures whilst on PEP

The combination of tenofovir and emtricitabine (Truvada) has been shown to reduce the risk of HIV acquisition in MSM when taken as PrEP.[19] PrEP activity has been demonstrated for several days after stopping. However the period of time it takes for HIV to be cleared from the body may be influenced by a number of factors, including whether early cycles of HIV replication occur. In animal studies PEP efficacy was reduced when 10 days of tenofovir was compared to 28 days. Subsequent animal studies of PrEP dosing continued for 28 days after last inoculation compared with discontinuation after last viral inoculation

demonstrated similar efficacy. Despite this it is still recommended to take a conservative approach and continue PrEP, (and therefore PEP) for 28 days after the last exposure until further data are available.[20]

If a patient reports further high risk exposures whilst on PEP the PEP course should be extended for 28 days after the last exposure. Consideration of PrEP may be appropriate in this circumstance.

Patients who are on PrEP

Those who present with an HIV exposure who are already on PrEP do not need PEP and should be advised to continue taking PrEP with focus on adherence. A third drug would only be considered in the setting of poor adherence to PrEP (<4 doses in the week of the exposure) and a high risk exposure (HIV positive source not on treatment or with detectable VL). Expert advice should be sought in this situation.

Transitioning from PEP to PrEP

Individuals may be transitioned directly from PEP to PrEP. An HIV test should be performed at the end of the PEP course and the patient prescribed PrEP without an interruption to daily dosing. Whilst it would be ideal to confirm negative HIV status at 12 weeks post PEP, this is often not possible and it is preferable to commence PrEP as soon as possible.

Patients who refuse baseline HIV testing

Of all patients presenting to the VNPEPS 1% have tested HIV positive at baseline. All patients presenting for PEP must have a baseline HIV test and PEP cannot be prescribed if this is not performed, even if the patient reports a negative test as recently as the previous week.

Individuals at negligible risk for HIV transmission who request PEP

This response may relate to anxiety, fear and possibly guilt about an apparently negligible exposure or may relate to undisclosed more serious risks of infection.

It is important that the clinician takes a supportive approach and documents all advice given, including that PEP was not recommended and whether or not it was prescribed. Early follow-up and a low threshold for psychological and HIV specialist referral is recommended. PEP should not be prescribed to allay anxiety where the HIV risk is negligible.

Preventive behaviours whilst being managed for HIV exposure

Patients should adopt preventive practices until their seronegative status is confirmed at week 12 follow-up. This applies to safe sexual and injecting practices as well as preventing exposure through other means such as accidents or body tissue donation. Women should be counselled about pregnancy, the risk of mother-to-child transmission and contraception.

Individuals who have been sexually assaulted

Complainants of sexual assault should be assessed for their need for PEP as early as possible after the event. Male-to-male anal sexual assault should always receive PEP. Heterosexual sexual assault may involve multiple assailants, unprotected vaginal, anal and oral penetration and result in genital and other physical trauma. While these factors may increase the risk of HIV exposure, it generally remains low and PEP is mostly not required unless the source has risk factors for HIV such as being from a high prevalence country or MSM.

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REFERENCES

1. Savage, J. and the National PEP Guidelines Reference Group. *Literature review for the National guidelines for post-exposure prophylaxis after non-occupational exposure to HIV*. 2012 [cited 21.03.2013]; Available from: <http://www.ashm.org.au/pep-guidelines>.
2. Boily, M.C., et al., *Heterosexual risk of HIV-1 infection per sexual act: systematic review and meta-analysis of observational studies*. *Lancet Infect Dis*, 2009. **9**(2): p. 118-29.
3. Vittinghoff, E., et al., *Per-contact risk of human immunodeficiency virus transmission between male sexual partners*. *Am J Epidemiol*, 1999. **150**(3): p. 306-11.
4. Jin, F., et al., *Per-contact probability of HIV transmission in homosexual men in Sydney in the era of HAART*. *Aids*. **24**(6): p. 907-13.
5. Baggaley, R.F., R.G. White, and M.C. Boily, *HIV transmission risk through anal intercourse: systematic review, meta-analysis and implications for HIV prevention*. *Int J Epidemiol*. **39**(4): p. 1048-63.
6. Cohen, M.S., et al., *Prevention of HIV-1 infection with early antiretroviral therapy*. *N Engl J Med*. **365**(6): p. 493-505.
7. Rodger, A.J., et al., *Sexual Activity Without Condoms and Risk of HIV Transmission in Serodifferent Couples When the HIV-Positive Partner Is Using Suppressive Antiretroviral Therapy*. *Jama*. **316**(2): p. 171-81.
8. Grulich, A.E., et al. *HIV Transmission in Male Serodiscordant Couples in Australia, Thailand and Brazil. Poster Number 1019LB. in Conference on Retroviruses and Opportunistic Infections (CROI 2015) Washington*.
9. Wiysonge, C.S., et al., *Male circumcision for prevention of homosexual acquisition of HIV in men*. *Cochrane Database Syst Rev*, 2011(6): p. CD007496.
10. Siegfried, N., et al., *Male circumcision for prevention of heterosexual acquisition of HIV in men*. *Cochrane Database Syst Rev*, 2009(2): p. CD003362.
11. Pedrana, A.E., et al., *High rates of undiagnosed HIV infections in a community sample of gay men in Melbourne, Australia*. *J Acquir Immune Defic Syndr*, 2012. **59**(1): p. 94-9.
12. The Kirby Institute, *HIV, viral hepatitis and sexually transmissible infections in Australia annual Surveillance Report 2015. The Kirby Institute, the University of New South Wales, Sydney, NSW, 2052*.
13. McDonald, A. *HIV, viral hepatitis and sexually transmissible infections in Australia: Annual surveillance report 2011*. [cited 14 March 2013]; Available from: [http://www.ned.unsw.edu.au/NCHECRweb.nsf/resources/2011/\\$file/KIRBY_ASR2011.pdf](http://www.ned.unsw.edu.au/NCHECRweb.nsf/resources/2011/$file/KIRBY_ASR2011.pdf)
14. Centers for Disease Control and Prevention, *Antiretroviral postexposure prophylaxis after sexual, injection-drug use, or other nonoccupational exposure to HIV in the United States: recommendations from the U.S. Department of Health and Human Services*. *MMWR*, 2005. **54**(No. RR-2): p. 1-19.
15. *Recommendations for Use of Antiretroviral Drugs in Pregnant HIV-1-Infected Women for Maternal Health and Interventions to Reduce Perinatal HIV Transmission in the United States*. 28 March 2014 [cited 14 August 2013]; Available from: <http://aidsinfo.nih.gov/guidelines>.
16. Bassett, I.V., K.A. Freedberg, and R.P. Walensky, *Two drugs or three? Balancing efficacy, toxicity, and resistance in postexposure prophylaxis for occupational exposure to HIV*. *Clin Infect Dis*, 2004. **39**(3): p. 395-401.
17. McAllister, J. and A. Carr, *Should a protease inhibitor be standard of care for HIV postexposure prophylaxis?* *Aids*. **25**(5): p. 721-2.
18. *TIVICAY (Dolutegravir as dolutegravir sodium) Product Monograph* ViiV Healthcare Available from: https://www.viivhealthcare.com/media/76391/Tivicay_PM-2014-03-11.pdf.
19. Grant, R.M., et al., *Preexposure chemoprophylaxis for HIV prevention in men who have sex with men*. *N Engl J Med*, 2010. **363**(27): p. 2587-99.
20. Seifert, S.M., et al., *Dose response for starting and stopping HIV preexposure prophylaxis for men who have sex with men*. *Clin Infect Dis*. **60**(5): p. 804-10.