**PrEP Review Supplement**

**0. Formulas**

**Rate Ratio**

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{A}/\_{B}}{^{C}/\_{D}}$$

$$LL, UL=\frac{A}{A+C}\pm 1.96×\sqrt{\frac{\frac{A}{A+C}×(1-\frac{A}{A+C})}{B+D}}$$

$$Rate Ratio 95\% CI=( \frac{LL}{1-LL}×\frac{D}{B} , \frac{UL}{1-UL}×\frac{D}{B} )$$

**Risk Ratio**

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{A}/\_{(A+B)}}{^{C}/\_{(C+D)}}$$

$$Risk Ratio 95\% CI=Risk Ratio×e\^(\pm 1.96×\sqrt{\frac{B}{A(A+B)}+\frac{D}{C(C+D)}})$$

**1. Studies comparing MSM at the beginning and end of studies**

**1.A Condomless Anal Sex**

**•** Demo Project (Rate Ratio) [23]

The Demo Project measured condomless anal sex by reporting the mean number of episodes with a condom in the last three months at baseline and the end of the study. Because they reported the mean number of episodes with a condom, we used the inverse of the rate ratio formula. The data for our study came from Figure 3A by Liu et al. The study reported a decrease in mean number of episodes with a condom from 6.33 episodes in the last 3 months at baseline among 557 people to a mean of 2.96 episodes with a condom during the last three months among 424 people at the end of the study.

A=(6.33\*424)=2682 episodes with a condom at baseline

B=(424\*3)=1272 person time at baseline

C=(2.96\*557)=1647 episodes with a condom at the end of study

D=(557\*3)=1671 person time at the end of study

$$Rate Ratio=\frac{^{Total number of events baseline}/\_{Person time baseline}}{^{Total number of events end of study}/\_{Person time end of study}}=\frac{^{2682}/\_{1272}}{^{1647}/\_{1671}}=2.14$$

$$LL, UL=\frac{1647}{1647+2682}\pm 1.96×\sqrt{\frac{\frac{1647}{1647+2682}×(1-\frac{1647}{1647+2682})}{1671+1272}}=LL=0.61, UL=0.63$$

$$Rate Ratio 95\% CI=\left( \frac{0.61}{1-0.61}×\frac{1272}{1671} , \frac{0.63}{1-0.63}×\frac{1272}{1671} \right)=2.01, 2.28$$

* Be-PrEP-Ared (Risk Ratio) [27]

Be-PrEP-Ared by Vuylsteke et al. compared daily PrEP users to event driven PrEP users before and after PrEP initiation, but for the purposes of our study, we focused on the daily PrEP users. The study measured condomless anal sex by the proportion of the sample reporting condomless anal sex in the last three months. Data for our study was digitally extracted from Figure 4 which the proportion of condomless receptive intercourse with casual partners over time per 3-month check-in. The study showed an increase of proportion reporting condomless intercourse from 52% of people at baseline (n=131) to 91% at the end of the study (n=17).

A=(0.91\*17)=15 people reporting condomless sex at end of study

B=((1-0.91)\*17)=2 people not reporting condomless sex at end of study

C=(0.52\*131)=68 people reporting condomless sex at baseline

D=((1-0.52)\*131)=63 people not reporting condomless sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{15}/\_{(2+15)}}{^{68}/\_{(63+68)}}=1.75$$

$Risk Ratio 95\% CI=1.75×e\^(\pm 1.96×\sqrt{\frac{2}{15(15+2)}+\frac{63}{68(68+63)}})=$(1.40, 2.19)

**•** PrEP Clinic in Rhode Island (Rate Ratio) [24]

The PrEP Clinic in Rhode Island measured condomless anal sex by reporting the mean number of condomless anal sex partners in the last three months at baseline and the end of the study. The data for our study came from text by Oldenburg et al. The study reported a increase in mean number of condomless anal sex partners from 2.0 condomless anal sex partners in the last 3 months at baseline among 61 people to a mean of 3.3 condomless anal sex partners during the last three months among 61 people at the end of the study.

A=(3.3 \*61)=201 condomless anal sex partners at the end of study

B=(61\*3)=183 person time at the end of study

C=(2.0\*61)=122 condomless anal sex partners at baseline

D=(557\*3)=183 person time at baseline

$$Rate Ratio\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{201}/\_{183}}{^{122}/\_{183}}=1.65$$

$$LL, UL=\frac{201}{201+122}\pm 1.96×\sqrt{\frac{\frac{201}{201+122}×(1-\frac{201}{201+122})}{183+183}}=LL=0.57, UL=0.68$$

$$Rate Ratio 95\% CI=\left( \frac{0.57}{1-0.57}×\frac{183}{183} , \frac{0.68}{1-0.68}×\frac{183}{183} \right)=1.33, 2.08$$

* PrEP Clinic in Paris (Risk Ratio) [28]

The PrEP Clinic in Paris by Noret et al. compared daily PrEP users to event driven PrEP users before and after PrEP initiation, but for the purposes of our study, we focused on the daily PrEP users. They reported condomless sex as the proportion reported condomless anal sex at their last sexual intercourse. Data for our study was found in the abstract of the study and in text in the results section. The results reported an increase of proportion reporting condomless sex at their last sexual intercourse from 53.3% (n=1045) at baseline to 79.0% (N=1045) at the end of the study.

A=(0.79\*1045)=826 people reporting condomless sex at end of study

B=((1-0.79)\*1045)=219 people not reporting condomless sex at end of study

C=(.533\*1045)=557 people reporting condomless sex at baseline

D=((1-.533)\*1045)=488 people not reporting condomless sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{826}/\_{(826+219)}}{^{557}/\_{(557+488)}}=1.48$$

$$Risk Ratio 95\% CI=1.48×e\^(\pm 1.96×\sqrt{\frac{219}{826\left(826+219\right)}+\frac{488}{557\left(557+488\right)}})=(1.39, 1.58)$$

* PHSKC STI Clinic (Risk Ratio) [29]

PHSKC STI Clinic by Montaño et al. reported the proportion of the sample reporting condomless anal ever with sexual partners within the preceding month at each point in the study and compared this proportion to the baseline. PHSKC STI Clinic reported the risk ratio with confidence intervals in Table 2. No calculations were needed.

$$Rate Ratio=1.46$$

$$Rate Ratio 95\% CI=(1.13, 1.88)$$

* RADAR (Rate Ratio) [25]

RADAR by Newcomb et al. reported condomless anal sex with sexual partners within the preceding 6 months at each point in the study. RADAR stated the rate ratio with confidence intervals in Table 3. No calculations were needed.

$$Rate Ratio=1.32$$

$$Rate Ratio 95\% CI=(1.00, 1.76)$$

* ANRS IPERGAY Follow-Up (Risk Ratio) [30]

The ANRS IPERGAY follow-up by Molina et al. measured condomless anal sex by the proportion reporting condomless anal sex at last anal sex and compared daily PrEP users to event driven PrEP users before and after PrEP initiation, but for the purposes of our study, we focused on the daily PrEP users. The data from our study came from text in the results section. The study reported an increase of condomless anal sex at last sexual intercourse from 77% at baseline (n=176) to 85% at the end of the study (n=77).

A=(0.85\*77)=66 people reporting condomless sex at end of study

B=((1-0.85)\*77)=11 people not reporting condomless sex at end of study

C=(0.77\*176)=136 people reporting condomless sex at baseline

D=((1-0.77)\*176)=40 people not reporting condomless sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{66}/\_{(66+11)}}{^{136}/\_{(136+40)}}=1.11$$

$$Risk Ratio 95\% CI=1.11×e\^(\pm 1.96×\sqrt{\frac{11}{66(66+11)}+\frac{40}{136(136+40)}})=\left(0.98,1.25)\right.$$

* PrEP Brasil (Risk Ratio) [31]

The PrEP Brasil study measured condomless anal sex by the proportion reporting condomless anal sex in the previous three months. The data for our study was digitized from Figure 2A. The study reported an increase of condomless anal sex at the last sexual intercourse form 45.1% (n=450) at baseline to 50.0% (n=375) at the end of the study.

A=(0.50\*375)=188 people reporting condomless anal sex at end of study

B=((1-0.5)\*375)=187 people not reporting condomless sex at end of study

C=(0.451\*450)=203 people reporting condomless anal sex at baseline

D=((1-0.451)\*450)=247 people not reporting condomless anal sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{188}/\_{(187+188)}}{^{203}/\_{(203+247)}}=1.11$$

$$Risk Ratio 95\% CI=1.11×e\^(\pm 1.96×\sqrt{\frac{187}{188\left(188+187\right)}+\frac{247}{203\left(203+\right)}})=(0.96, 1.28)$$

* AmPrEP (Rate Ratio) [26]

The AmPrEP study by Hoornenborg et al. reported the number of condomless sex acts within the three months prior to the study and at each check in comparing daily PrEP users to event driven PrEP users before and after PrEP initiation, but for the purposes of our study, we focused on the daily PrEP users. The data for our study came from Table 4. The study reported rate ratio comparing rates of condomless sex acts at end of the study to the beginning, so no calculations were needed.

$$Rate Ratio=1.05$$

$$Rate Ratio 95\% CI=(1.02, 1.09)$$

* ANRS IPERGAY (Risk Ratio) [32]

The ANRS IPERGAY by Sagaon-Teyssier et al. measured condomless anal sex by the proportion reporting condomless anal sex at last anal sex. The data for our study came from Figure 3C. The study reported a decrease of condomless anal sex at the last sexual intercourse from 71.4% (n=336) at baseline to 65.1% (n=72) at the end of the study.

A=(0.651)\*72=46 people reporting condomless anal sex at end of study

B=(1-0.651)\*72=25 people not reporting condomless anal sex at end of study

C=(0.714\*336)=240 people reporting condomless anal sex at baseline

D=(1-0.714)\*336=96 people not reporting condomless anal sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{47}/\_{(47+25)}}{^{240}/\_{(240+337)}}=0.91$$

$$Risk Ratio 95\% CI=0.91×e\^(\pm 1.96×\sqrt{\frac{25}{46\left(46+25\right)}+\frac{96}{240\left(240+96\right)}})=(0.76,1.10)$$

* CDC Safety Study (Risk Ratio) [33]

The CDC Safety Study by Liu et al. measured condomless anal sex by the proportion reporting condomless anal sex within the last three months. The data for our study was digitized from Figure 3B. The study reported a decrease of condomless anal sex at the last sexual intercourse from 55.1% (n=200) at baseline to 49.8% (n=200) at the end of the study.

A=(0.49755\*200)=100 people reporting condomless sex at end of study

B=(1-0.49755\*200)=100 people not reporting condomless sex at end of study

C=(0.55136\*200)=110 people reporting condomless sex at baseline

D=(1-0.55136\*200)=90 people not reporting condomless sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{100}/\_{(100+100)}}{^{110}/\_{(110+900)}}=0.90$$

$$Risk Ratio 95\% CI=0.90×e\^(\pm 1.96×\sqrt{\frac{100}{100\left(100+100\right)}+\frac{90}{110\left(110+90\right)}})=(0.75,1.09)$$

**1.B Partner Acquisition**

**•** PrEP Clinic in Rhode Island (Rate Ratio) [24]

The PrEP Clinic in Rhode Island measured partner acquisition by reporting the mean number of anal sex partners in the last three months at baseline and the end of the study. The data for our study came from text by Oldenburg et al. The study reported an increase in mean number of anal sex partners from 4.9 condomless anal sex partners in the last 3 months at baseline among 61 people to a mean of 5.7 anal sex partners during the last three months among 61 people at the end of the study.

A=(5.7 \*61)=348 anal sex partners at the end of study

B=(61\*3)=183 person time at the end of study

C=(4.9\*61)=299 anal sex partners at baseline

D=(557\*3)=183 person time at baseline

$$Rate Ratio\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{348}/\_{183}}{^{299}/\_{183}}=1.16$$

$$LL, UL=\frac{348}{348+299}\pm 1.96×\sqrt{\frac{\frac{348}{348+299}×(1-\frac{348}{348+299})}{183+183}}=LL=0.50, UL=0.58$$

$$Rate Ratio 95\% CI=\left( \frac{0.50}{1-0.50}×\frac{183}{183} , \frac{0.58}{1-0.58}×\frac{183}{183} \right)=1.00, 1.36$$

* PHSKC STI Clinic (Rate Ratio) [29]

PHSKC STI Clinic by Montaño et al. reported the number of sexual partners within the preceding months at each point in the study. RADAR PHSKC STI Clinic the rate ratio with confidence intervals in Table 2. No calculations were needed.

$$Rate Ratio=1.03$$

$$Rate Ratio 95\% CI=(0.86, 1.23)$$

* AmPrEP (Rate Ratio) [26]

The AmPrEP study by Hoornenborg et al. reported the number of sexual partners acts within the three months prior to the study and at each check in among compared daily PrEP users to event driven PrEP users before and after PrEP initiation, but for the purposes of our study, we focused on the daily PrEP users. The data for our study came from Table 4. The study reported rate ratio comparing rates of sexual partners at end of the study to the beginning, so no calculations were needed.

$$Rate Ratio=1.01$$

$$Rate Ratio 95\% CI=(0.97, 1.03)$$

* Demo Project (Rate Ratio) [23]

The Demo Project by Liu et al. reported the mean number of sexual partners within the three months prior to the study and at each check in. The data for our study came from the text in the abstract and results section. The study reported a decrease in mean number of sexual partners of 10.9 (n=557) at baseline to 9.3 (n=437) at the end of the study.

A=(9.3\*437)=4064 total sexual partners at end of study

B=(437\*3 months)=1311 person months at end of study

C=(10.9\*557)=6071 total sexual partners at baseline

D=(557\*3 months)=1671 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{4064}/\_{1311}}{^{6071}/\_{1671}}=.85$$

$$LL, UL=\frac{4064}{4064+6071}\pm 1.96×\sqrt{\frac{\frac{4064}{4064+6071}×(1-\frac{4064}{4064+6071})}{1311+1671}}=LL=0.39,UL=0.41$$

$$Rate Ratio 95\% CI=\left( \frac{0.39}{1-0.39}×\frac{1671}{1311} , \frac{0.41}{1-0.41}×\frac{1671}{1311} \right)=(0.82, 0.89)$$

* CDC Safety (Rate Ratio) [33]

The CDC Safety Study by Liu et al. reported the mean number of sexual partners within the three months prior to the study and at each check in. The data for our study came from the text in and results section. The study reported a decrease in mean number of sexual partners of 7.25 (n=400) at baseline to 5.71 (n=344) at the end of the study.

A=(5.71\*344)=1919 total sexual partners at end of study

B=(344\*3 months)=1008 person months at end of study

C=(7.25\*400)=2900 total sexual partners at baseline

D=(344\*3 month)=1200 person months at end of study

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{1919}/\_{1008}}{^{2900}/\_{1200}}=0.79$$

$$LL, UL=\frac{1919}{1919+2900}\pm 1.96×\sqrt{\frac{\frac{1919}{1919+2900}×(1-\frac{1919}{1919+2900})}{1008+1200}=LL=0.38, UL=0.41)}$$

$$Rate Ratio 95\% CI=\left( \frac{0.38}{1-0.38}×\frac{1200}{1008}, \frac{0.41}{1-0.41}×\frac{1200}{1008} \right)=(0.74, 0.83)$$

* PrEP Brasil (Rate Ratio) [31]

The PrEP Brasil study by Grinsztejn et al. reported the mean number of sexual partners within the three months prior to the study and at each check in. The data for our study came from the text in and results section. The study reported a decrease in mean number of sexual partners of 11.4 (n=436) at baseline to 8.3 (n=356) at the end of the study.

A=(8.3\*356)=2955 total sexual partners at end of study

B=(356\*3 months)=1068 person months at end of study

C=(11.4\*436)=4970 total sexual partners at baseline

D=(436\*3 months)=1308 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{2955}/\_{1068}}{^{4970}/\_{1308}}=0.73$$

$$LL, UL=\frac{2955}{2955+4970}\pm 1.96×\sqrt{\frac{\frac{2955}{2955+4970}×(1-\frac{2955}{2955+4970})}{1068+1308}}=LL=0.36, UL=0.38$$

$$Rate Ratio 95\% CI=\left(\frac{0.36}{1-0.36}×\frac{1308}{1068}, \frac{0.38}{1-0.38}×\frac{1308}{1068} \right)=(0.70,0.76)$$

**1.C Serodiscordance**

* PHSKC STI Clinic (Risk Ratio) [29]

PHSKC STI Clinic by Montaño et al. reported the proportion of the sample reporting a serodiscordant partner within the preceding months at each point in the study. RADAR PHSKC STI Clinic the risk ratio with confidence intervals in Table 2. No calculations were needed.

$$Rate Ratio=1.02$$

$$Rate Ratio 95\% CI=(0.83, 1.26)$$

* CDC Safety (Risk Ratio) [33]

The CDC Safety Study by Liu et al. reported the proportion of participants reporting an HIV-positive sex partner at baseline and each follow up visit. The data for our study came from the text in and results section. The study reported a decrease in proportion reporting an HIV positive sex partner from 30% (n=400) at baseline to 27% (n=400) at the end of the study.

A=((1-0.30)\*400)=280 people reporting an HIV positive sex partner at end of study

B=(0.30\*400)=120 people not reporting an HIV positive sex partner at end of study

C=((1-0.27)\*400)=292 people reporting an HIV positive sex partner at baseline

D=(0.27\*400)=108 people not reporting an HIV positive sex partner at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{280}/\_{(280+120)}}{^{292}/\_{(292+108)}}=0.96$$

$$Risk Ratio 95\% CI=0.96×e\^(\pm 1.96×\sqrt{\frac{120}{280\left(280+120\right)}+\frac{108}{292\left(292+108\right)}})=(0.88, 1.05)$$

* PrEP Brasil (Risk Ratio) [31]

The PrEP Brasil study by Grinsztejn et al. reported the number of participants reporting an HIV-positive sex partner at baseline and at each follow up check in. The data for our study came from the Tables 1 and 2. The study reported a decrease in number of people reporting an HIV positive sex partner from 184 at baseline to 148 people at the end of the study.

A=148 people reporting an HIV positive partner at end of study

B=227 people not reporting an HIV positive partner at end of study

C=184 people reporting an HIV positive partner at baseline

D=181 not reporting an HIV positive partner at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{148}/\_{(148+227)}}{^{184}/\_{(184+181)}}=0.78$$

$$Risk Ratio 95\% CI=0.78×e\^(\pm 1.96×\sqrt{\frac{227}{148\left(148+227\right)}+\frac{181}{184\left(184+181\right)}})=(0.67,0.92)$$

**1.D Sex Acts**

* RADAR-Total Anal Sex (Rate ratio) [25]

RADAR by Newcomb et al. reported sexual acts with partners within the preceding 6 months at each point int the study. RADAR stated the total anal sex rate ratio with confidence interval in Table 3. No calculations were needed.

$Rate Ratio=$1.07

$$Rate Ratio 95\% CI=(0.90,1.28)$$

* RADAR-Receptive Anal Sex (Rate ratio) [25]

RADAR by Newcomb et al. reported receptive anal sexual acts with partners within the preceding 6 months at each point in the study. RADAR stated the receptive anal sex rate ratio with confidence interval in Table 3. No calculations were needed.

$Rate Ratio=$1.27

$$Rate Ratio 95\% CI=(1.00,1.61)$$

* RADAR-Insertive Anal Sex (Rate ratio) [25]

RADAR by Newcomb et al. reported insertive sexual acts with partners within the preceding 6 months at each point int the study. RADAR stated the insertive anal sex rate ratio with confidence interval in Table 3. No calculations were needed.

$Rate Ratio=$0.89

$$Rate Ratio 95\% CI=(0.68,1.16)$$

* PHSKC STI Clinic- Receptive Anal Sex (Risk Ratio) [29]

PHSKC STI Clinic by Montaño et al. reported the proportion of the sample reporting receptive anal ever with sexual partners within the preceding months at each point in the study. RADAR PHSKC STI Clinic the risk ratio with confidence intervals in Table 2. No calculations were needed.

$$Risk Ratio=1.01$$

$$Risk Ratio 95\% CI=(0.95, 1.08)$$

* PHSKC STI Clinic-Insertive Anal Sex (Risk Ratio) [29]

PHSKC STI Clinic by Montaño et al. reported the proportion of the sample reporting insertive anal ever with sexual partners within the preceding months at each point in the study. RADAR PHSKC STI Clinic the risk ratio with confidence intervals in Table 2. No calculations were needed.

$$Risk Ratio=1.00$$

$$Risk Ratio 95\% CI=(0.93, 1.08)$$

* AmPrEP-Total Anal Sex [26]

AmPrEP by Hoornenborg et al. measured sexual acts by the number of anal sex acts reported within the past three months at baseline and at each check in the study among compared daily PrEP users to event driven PrEP users before and after PrEP initiation, but for the purposes of our study, we focused on the daily PrEP users.. AmPrEP stated the risk ratio with confidence interval in Table 4. No calculations were needed.

$Rate Ratio=$1.01

$$Rate Ratio 95\% CI=(0.98, 1.03)$$

**2. Studies Comparing MSM at Beginning and End of Studies in Arms: PrEP vs. Non-PrEP**

**2.A Condomless Anal Sex**

* TAPIR-Receptive-PrEP (Rate Ratio) [34]

TAPIR by Milam et al. did not report changes in total condomless sex, but it was stratified by mean number of insertive and receptive episodes in the past month at baseline and halfway through the study at week 24. The data for baseline came from Table 1 and the changes in mean number of condomless acts came from Table 3. Among the PrEP arm, the mean number of condomless receptive anal sex was 2.16 condomless receptive anal sex acts in the past month at baseline (n=398) to a reported increase of mean by 0.54 condomless receptive anal sex acts in the past month at follow-up (n=274).

A=(2.16+0.54)\*274=740 total condomless receptive anal sex episodes at the end of the study

B=(274\*1 month)=274 person months at the end of the study

C=(2.16)\*398=860 total condomless receptive anal sex episodes at baseline

D=(398\*1 month)=398 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{740}/\_{274}}{^{860}/\_{398}}=1.25$$

$$LL, UL=\frac{740}{740+860}\pm 1.96×\sqrt{\frac{\frac{740}{740+860}×(1-\frac{740}{740+860})}{274+398}}=LL=0.44, UL=0.49$$

$$Rate Ratio 95\% CI=\left( \frac{0.44}{1-0.44}×\frac{398}{274} , \frac{0.49}{1-0.49}×\frac{398}{274} \right)=(1.13,1.38)$$

* TAPIR-Receptive-Non-PrEP (Rate Ratio) [34]

TAPIR by Milam et al. did not report changes in total condomless sex, but it was stratified by mean number of insertive and receptive episodes in the past month at baseline and halfway through the study at week 24. The data for baseline came from Table 1 and the changes in mean number of condomless acts came from Table 3. Among the non-PrEP arm, mean number of condomless receptive anal sex was 1.5 condomless receptive anal sex acts in the past month at baseline (n=99) to a reported increase of mean by 0.01 condomless receptive anal sex acts in the past month at follow-up (n=72).

A=(1.5+0.01)\*72=109 total condomless receptive anal sex episodes at the end of the study

B=(72\*1 month)=72 person months at the end of the study

C=(1.5\*99)=149 total condomless receptive anal sex episodes at baseline

D=(99\*1 month)=99 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{109}/\_{72}}{^{149}/\_{99}}=1.01$$

$$LL, UL=\frac{109}{109+149}\pm 1.96×\sqrt{\frac{\frac{109}{109+149}×\left(1-\frac{109}{109+149}\right)}{72+99}}=LL=0.36, UL=0.48$$

$$Rate Ratio 95\% CI=\left( \frac{0.36}{1-0.36}×\frac{99}{72} , \frac{0.48}{1-0.48}×\frac{99}{72} \right)=(0.78,1.19)$$

* TAPIR-Insertive-PrEP (Rate Ratio) [34]

TAPIR by Milam et al. did not report changes in total condomless sex but stratified the mean number of insertive and receptive episodes in the past month at baseline and halfway through the study at week 24. The data for baseline came from Table 1 and the changes in mean number of condomless acts came from Table 3. Among the PrEP arm, mean number of condomless insertive anal sex was 2.8 condomless insertive anal sex acts in the past month at baseline (n=398) to a reported decrease of mean by 0.66 condomless insertive anal sex acts in the past month at follow-up (n=274).

A=(2.8-0.66)\*274=586 total condomless insertive anal sex episodes at the end of the study

B=274\*1=274 person months at the end of the study

C=2.8\*398=1114 total condomless insertive anal sex episodes at baseline

D=398\*1=398 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{740}/\_{274}}{^{860}/\_{398}}=0.76$$

$$LL, UL=\frac{586}{586+1114}\pm 1.96×\sqrt{\frac{\frac{586}{586+1114}×(1-\frac{586}{586+1114})}{274+398}}=LL=0.32, UL=0.37$$

$$Rate Ratio 95\% CI=\left( \frac{0.32}{1-0.32}×\frac{398}{274} , \frac{0.37}{1-0.37}×\frac{398}{274} \right)=(0.69,0.84)$$

* TAPIR-Insertive -Non-PrEP (Rate Ratio) [34]

TAPIR by Milam et al. did not report changes in total condomless sex but stratified the mean number of insertive and receptive episodes in the past month at baseline and halfway through the study at week 24. The data for baseline came from Table 1 and the changes in mean number of condomless acts came from Table 3. Among the non-PrEP arm, mean number of condomless insertive anal sex was 2.25 condomless insertive anal sex acts in the past month at baseline (n=99) to a reported decrease of mean by 0.58 condomless insertive anal sex acts in the past month at follow-up (n=72).

A=(2.25-0.58)\*72=120 total condomless insertive anal sex episodes at the end of the study

B=(72\*1 month)=72 person months at the end of the study

C=(2.25\*99)=223 total condomless insertive anal sex episodes at baseline

D=(99\*1 month)=99 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{120}/\_{72}}{^{223}/\_{99}}=0.74$$

$$LL, UL=\frac{120}{120+223}\pm 1.96×\sqrt{\frac{\frac{120}{120+223}×(1-\frac{120}{120+223})}{72+99}}=LL=0.30, UL=0.40$$

$$Rate Ratio 95\% CI=\left( \frac{0.30}{1-0.30}×\frac{99}{72} , \frac{0.40}{1-0.40}×\frac{99}{72} \right)=(0.59,0.92)$$

* PROUD-PrEP (Risk Ratio) [35]

The PROUD study by Grant et al. reported changes in condomless anal sex through the proportion and total number of the sample reporting condomless anal sex in the previous month at baseline and at follow-up studies. The data from our study was found in text in the results section of the PROUD publication. Among the PrEP arm, PROUD reported a decrease in condomless anal sex from 377 (34%) at baseline (n=1115) to 232 (25%) at follow-up (n=926).

A=(0.25\*926)=232 reporting condomless anal sex at end of study

B=(1-0.25)\*926=694 not reporting condomless anal sex at end of study

C=(0.34\*1115)=377 reporting condomless anal sex at baseline

D=(1-0.34)\*1115=798 not reporting condomless anal sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{232}/\_{(232+694)}}{^{377}/\_{(377+798)}}=0.74$$

$$Risk Ratio 95\% CI=0.74×e\^(\pm 1.96×\sqrt{\frac{694}{232\left(232+694\right)}+\frac{798}{377\left(377+798\right)}})=(0.64,0.85)$$

* PROUD-Non-PrEP (Risk Ratio) [35]

The PROUD study by Grant et al. reported changes in condomless anal sex through the proportion and total number of the sample reporting condomless anal sex in the previous month at baseline and at follow-up studies. The data from our study was found in text in the results section of the PROUD publication. Among the PrEP arm, PROUD reported a decrease in condomless anal sex from 101 (27%) at baseline (n=369) to 61 (20%) at follow-up (n=304).

A=(0.20\*304)=61 reporting condomless anal sex at end of study

B=(1-0.20)\*304=243 not reporting condomless anal sex at end of study

C=(0.27\*369)=101 reporting condomless anal sex at baseline

D=(1-0.27)\*369=268 not reporting condomless anal sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{61}/\_{(61+243)}}{^{101}/\_{(101+268)}}=0.73$$

$$Risk Ratio 95\% CI=0.73×e\^(\pm 1.96×\sqrt{\frac{243}{61\left(61+243\right)}+\frac{268}{101\left(101+268\right)}})=(0.55,0.97)$$

* iPrEx-PrEP (Risk Ratio) [36]

The iPrEx study by Marcus et al. measured the proportion of the study population reporting condom use. To compare this study to others, we limited the results of the study to week 48. The data for our study was digitized from Figure 1B for those perceived to be on PrEP from baseline to week 48. The study reported an increase in condom use from 55% at baseline (n=400) to week 72% at week 48 (n=306). In addition, we calculated those not using a condom from this data, 45% at baseline reported not using a condom to 28% reporting not using a condom at week 48.

A=((1-0.72)\*306)=87 reporting condomless anal sex at the end of the study

B=(0.72\*306)=219 not reporting condomless anal sex at the end of the study

C=((1-0.55)\*400)=181 reporting condomless anal sex at baseline

D=(0.55\*400)=219 not reporting condomless anal sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{87}/\_{(87+219)}}{^{181}/\_{(181+219)}}=0.63$$

$$Risk Ratio 95\% CI=0.63×e\^(\pm 1.96×\sqrt{\frac{219}{87\left(87+219\right)}+\frac{219}{181\left(181+219\right)}})=(0.51,0.77)$$

* iPrEX-Non-PrEP (Risk Ratio) [36]

The iPrEx study by Marcus et al. measured the proportion of the study population reporting condom use. To compare this study to others, we limited the results of the study to week 48. The data for our study was digitized from Figure 1B for those perceived to be in the non-PrEP arm from baseline to week 48. The study reported an increase in condom use from 51% at baseline (n=167) to week 72% at week 48 (n=113). In addition, we calculated those not using a condom from this data, 49% at baseline did not use a condom to 28% at week 48 did not use a condom.

A=(1-0.717)\*113=32 reporting condomless anal sex at the end of the study

B=.717\*113=81 not reporting condomless anal sex at the end of the study

C=(1-0.51)\*167=82 reporting condomless anal sex at baseline

D=0.51\*167=85 not reporting condomless anal sex at baseline

$$Risk Ratio=\frac{^{Total reporting behavior end of study}/\_{Total sample size end of study}}{^{Total reporting behavior baseline}/\_{Total sample size baseline }}=\frac{^{32}/\_{(32+81)}}{^{82}/\_{(82+85)}}=0.58$$

$$Risk Ratio 95\% CI=0.58×e\^(\pm 1.96×\sqrt{\frac{81}{32\left(32+81\right)}+\frac{85}{82\left(82+85\right)}})=(0.42,0.81)$$

2.2 Partner Acquisition

* iPrEX- PrEP (Rate Ratio) [36]

The iPrEx study by Marcus et al. measured the partner acquisition by reporting the mean number of anal sex partners within the past three months at baseline and at follow-up. To compare this study to others, we limited the results of the study to week 48. The data for our study was digitized from Figure 1B for those perceived to be on PrEP from baseline to week 48. Among the PrEP arm, the study reported a decrease in mean number of anal sex partners from 13.00 partners in the past three months per person at baseline (n=547) to 6.65 partners in the past three months per person at week 48 (n=406).

A=(6.65\*406)=2700 total anal sex partners at end of study

B=(406\* 3 months)=1218 person months at end of study

C=(13.00\*547)=7111 total anal sex partners at baseline

D=(547\*3 months)=1641 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{2700}/\_{1218}}{^{7111}/\_{1641}}=0.51$$

$$LL, UL=\frac{2700}{2700+7111}\pm 1.96×\sqrt{\frac{\frac{2700}{2700+7111}×(1-\frac{2700}{2700+7111})}{1218+1641}}=LL=0.27, UL=0.28$$

$$Rate Ratio 95\% CI=\left( \frac{0.27}{1-0.27}×\frac{1641}{1218} , \frac{0.28}{1-0.28}×\frac{1641}{1218} \right)=(0.49,0.53)$$

* iPrEX- Non-PrEP (Rate Ratio) [36]

The iPrEx study by Marcus et al. measured the partner acquisition by reporting the mean number of anal sex partners within the past three months at baseline and at follow-up. To compare this study to others, we limited the results of the study to week 48. The data for our study was digitized from Figure 1B for those perceived to be in the non-PrEP arm from baseline to week 48. Among the non-PrEP arm, the study reported a decrease in mean number of anal sex partners from 7.5 partners in the past three months per person at baseline (n=221) to 4.00 partners in the past three months per person at week 48 (n=162).

A=(4.00\*162)=648 total anal sex partners at end of study

B=(162\* 3 months)=486 person months at end of study

C=(7.5\*221)=1658 total anal sex partners at baseline

D=(221\*3 months)=663 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{648}/\_{486}}{^{1658}/\_{663}}=0.53$$

$$LL, UL=\frac{648}{648+1658}\pm 1.96×\sqrt{\frac{\frac{648}{648+1658}×(1-\frac{648}{648+1658})}{486+663}}=LL=0.26, UL=0.30$$

$$Rate Ratio 95\% CI=\left( \frac{0.26}{1-0.26}×\frac{663}{486}, \frac{0.30}{1-0.30}×\frac{663}{486} \right)=(0.49, 0.58)$$

2.3 Serodiscordance

* TAPIR-PrEP (Rate Ratio) [34]

The TAPIR study by Milam et al. reported the mean number of HIV positive partners in the past month at baseline and halfway through the study at week 24. The data for baseline came from Table 1 and the changes in mean number of HIV positive partners came from Table 3. Among the PrEP arm, mean number HIV positive partners was 0.96 per person in the past month at baseline (n=398) to a reported increase of mean by 0.21 of HIV positive partners in the past month at follow-up (n=274).

A=(0.96+0.21)\*274=321 total HIV positive partners at end of study

B=(274\*1 month)=274 person months at end of study

C=(0.96\*398=382 total HIV positive partners at baseline

D=(398\*1 month)=398 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{321}/\_{274}}{^{382}/\_{398}}=1.22$$

$$LL, UL=\frac{321}{321+382}\pm 1.96×\sqrt{\frac{\frac{321}{321+382}×(1-\frac{321}{321+382})}{274+398}}=LL=0.42, UL=0.49)$$

$$Rate Ratio 95\% CI=\left( \frac{0.42}{1-0.42}×\frac{398}{274} , \frac{0.49}{1-0.49}×\frac{398}{274} \right)=(1.05,1.41)$$

* TAPIR-Non-PrEP (Rate Ratio) [34]

The TAPIR study by Milam et al. reported the mean number of HIV positive partners in the past month at baseline and halfway through the study at week 24. The data for baseline came from Table 1 and the changes in mean number of HIV positive partners came from Table 3. Among the PrEP arm, mean number HIV positive partners was 0.75 per person in the past month at baseline (n=99) to a reported decrease of mean by 0.24 of HIV positive partners in the past month at follow-up (n=72).

A=(0.75 – 0.24)\*72=37 total HIV positive partners at the end of the study

B=(72\*1 month)=72 person months at the end of the study

C=(0.75\*99)=74 total HIV positive partners at baseline

D=(99\*1 month)=99 person months at baseline

$$Rate Ratio=\frac{^{Total number of events end of study}/\_{Person time end of study}}{^{Total number of events baseline}/\_{Person time baseline}}=\frac{^{37}/\_{72}}{^{74}/\_{99}}=0.69$$

$$LL, UL=\frac{37}{37+74}\pm 1.96×\sqrt{\frac{\frac{37}{37+74}×(1-\frac{37}{37+74})}{72+99}=LL=}0.25, UL=0.42$$

$$Rate Ratio 95\% CI=\left( \frac{0.25}{1-0.25}×\frac{99}{72} , \frac{0.42}{1-0.42}×\frac{99}{72} \right)=(0.44,0.94)$$