# PrEP Non-Persistence and New HIV Diagnoses: A Real-World Analysis of >120,000 People Prescribed PrEP

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# Conclusions

- The IQVIA Longitudinal Prescription Data and Diagnosis (LRxDx) prescriptions-claims database enables large-scale analyses of characteristics associated with PrEP non-persistence, and the disproportionate real-world impact of non-persistence on HIV-1 incidence rates at a population level
- This analysis demonstrated that the greatest predictor of acquiring HIV-1 infection was being off-PrEP, with off-PrEP periods resulting in an overall 2-fold increased risk of HIV-1 infection versus on-PrEP periods
- The off-PrEP versus on-PrEP incidence rate ratio (IRR) of HIV-1 infection was highest among cisgender men and transgender women compared with other gender groups
- Similarly, the off-PrEP versus on-PrEP IRR of HIV-1 infection was highest for individuals aged 25–34 and 35–44 years compared with other age groups
- The Midwest had the highest off-PrEP IRR when compared with other regions of the US
- Efforts must be made to improve PrEP persistence during periods when people can continue to benefit from PrEP, while ensuring a safe transition off PrEP when it is no longer required
- This analysis highlighted that cisgender men, transgender women, individuals aged 25–44 years, and individuals living in Midwest US, had the highest rates of new HIV-1 diagnoses during off-PrEP periods
- High HIV-1 incidences during off-PrEP periods highlight how ongoing work is needed to address barriers to sustained PrEP use

# **Plain-Language Summary**

Pre-exposure prophylaxis medications, if taken as prescribed, are effective at preventing HIV-1 infection; however, if not taken properly during HIV-1 exposure, they do not work as well. This study sought to understand the rate of new HIV-1 infections when individuals were off pre-exposure prophylaxis (not taking it every day during times when someone could be exposed to HIV-1) across gender, age, and United States regions. Cisgender men and transgender women had the highest chance of being diagnosed with HIV-1 infection when they were not taking pre-exposure prophylaxis compared with other gender groups. This was also the case for people aged 25–44 years compared with other age groups analyzed. We found that during times when individuals were not taking pre-exposure prophylaxis, the chances of acquiring HIV-1 infection were doubled compared with times when individuals were taking pre-exposure prophylaxis. There is a need to support individuals to take pre-exposure prophylaxis as prescribed, to reduce risk of HIV-1 infection.

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### Background

- Daily oral HIV-1 PrEP with emtricitabine/tenofovir disoproxil fumarate (F/TDF) or emtricitabine/tenofovir alafenamide (F/TAF) is highly effective at preventing HIV-1 infection when taken as prescribed<sup>1,2</sup>
- Despite this, discontinuation and non-persistence (lack of sustained PrEP use during periods of HIV-1 exposure) is common, reducing real-world PrEP effectiveness
- Analyzing the impact of discontinuation and PrEP non-persistence on HIV-1 infection diagnoses is crucial to optimizing PrEP care delivery and prioritizing resources to support sustained PrEP use<sup>4</sup>
- The impact of PrEP non-persistence on new HIV-1 infections at the population level has not been well characterized<sup>5</sup>
- The IQVIA LRxDx database is a large, longitudinal, real-world, anonymized database, based on retail-pharmacy and medical-claims data — Data are captured on co-prescriptions as well as new, switch, and repeat prescriptions from pharmacies covering 93% of outpatient prescription activity in the US<sup>6,7</sup>

# Objectives

• To use a large, real-world database to evaluate the impact of PrEP non-persistence on HIV-1 infection incidence in people who would benefit from PrEP. and who were prescribed oral PrEP regimens in the US

# Methods

### **Population**

- PrEP-naïve individuals aged ≥18 years with ≥1 oral F/TAF or F/TDF for HIV-1 PrEP prescription between April 2021 and March 2022 were identified from the IQVIA LRxDx database
- Individuals with a history of HIV-1 diagnosis or treatment, HIV-1 post-exposure prophylaxis or chronic hepatitis B were excluded
- Transgender men and women were identified by an algorithm incorporating history for gender dysphoria and gender-affirming surgery or hormone therapy — Individuals not identified as transgender were classified as cisgender men or women
- Individuals were followed for up to 12 months from the date of the first prescription claim submitted
- Censoring criteria were new HIV-1 diagnoses during the study period, or end of study

### **Defining PrEP Non-Persistence**

- Periods of PrEP non-persistence were defined as
- Gaps: Prescription claims of >30 days following the end of the calculated PrEP supply until start of next PrEP claim
- Discontinuation: From the end of the calculated supply for the last PrEP claim to the end of follow-up (end of 12-month observation window or new HIV-1 infection, whichever comes earlier)

— Discontinuation: PrEP stop without re-initiation or additional claims after the last PrEP use

#### **New HIV-1 Infection Diagnoses**

• New HIV-1 infection diagnoses were defined based on the International Classification of Diseases 10<sup>th</sup> Revision diagnosis and treatment initiation codes **HIV-1 Incidence Rates** 

• HIV-1 incidence rates were calculated by dividing the number of new HIV-1 infections by the observed person years (PY) for each period using Poisson regression

- Rates were determined during periods when individuals had PrEP on hand (on-PrEP) versus periods of PrEP non-persistence (off-PrEP)
- Rates were stratified by gender, age, and US region

#### Number Needed to Persist on Oral PrEP

The number of individuals required to stay on oral PrEP to prevent one new HIV-1 infection (number needed to persist) were estimated for individuals to be a start of the star each US state<sup>8</sup>:

— Numbers needed to persist is calculated as: (Incidence rate<sub>Off-PrEP</sub> – Incidence rate<sub>On-PrEP</sub>)

#### **Trend of HIV-1 Incidence Rates**

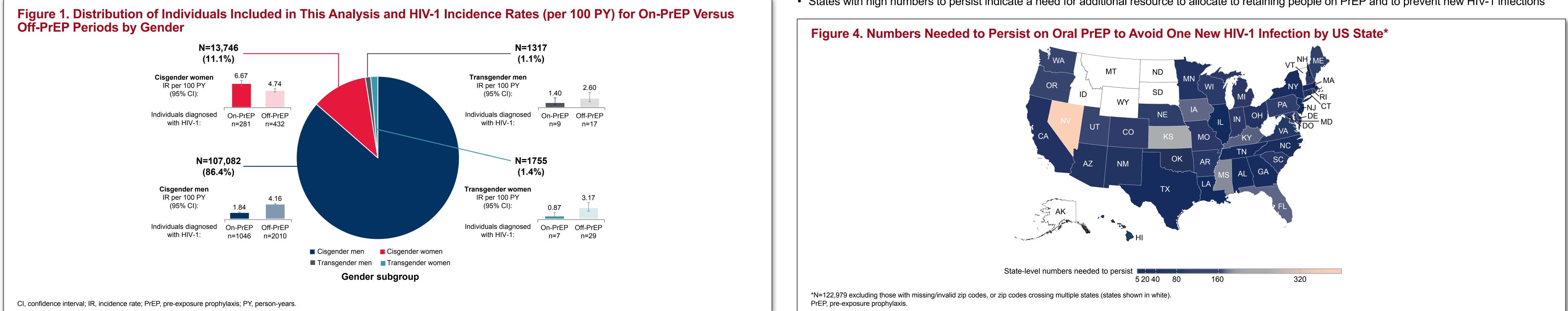
• Data for on- and off-PrEP HIV-1 incidence trends were extracted from 2016 to April 2021 to enable analysis over an extended time frame, and to provide context to the results obtained between April 2021 to March 2022

# Results

- Demographics
- A total of 123,901 PrEP-naïve adults (median age, 31 years; interguartile range, 25–40) were included in this analysis
- A breakdown of individuals by gender and age at first PrEP claim is shown in Figure 1 and Figure 2, respectively

### HIV-1 Incidence Rates by Gender (Figure 1)

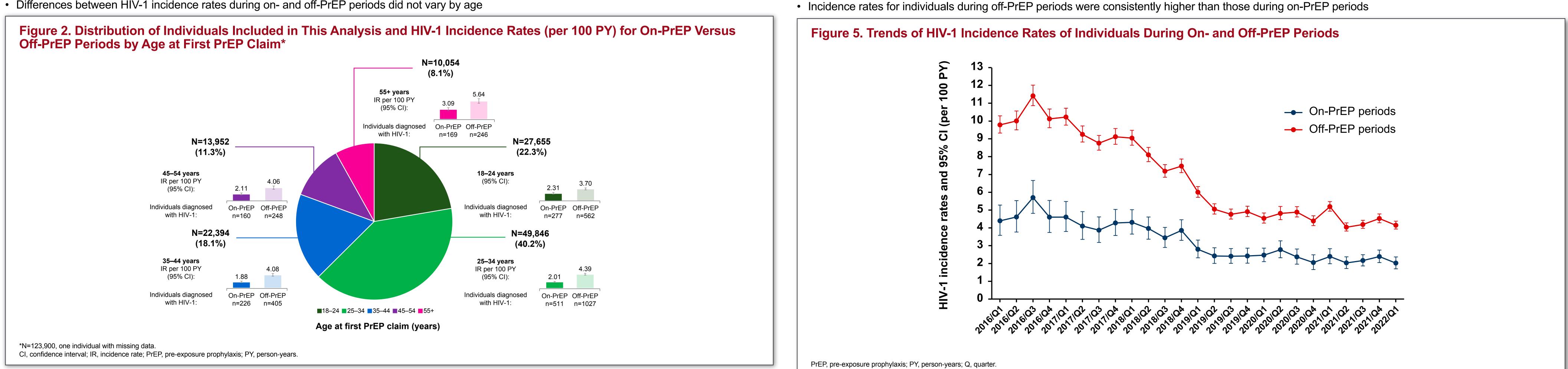
- Overall, HIV-1 incidence rates (off-PrEP and on-PrEP) were highest in cisgender women
- Transgender women had the lowest HIV-1 incidence rates during on-PrEP periods (0.87 per 100 PY) compared with other gender groups



# **Results (continued)**

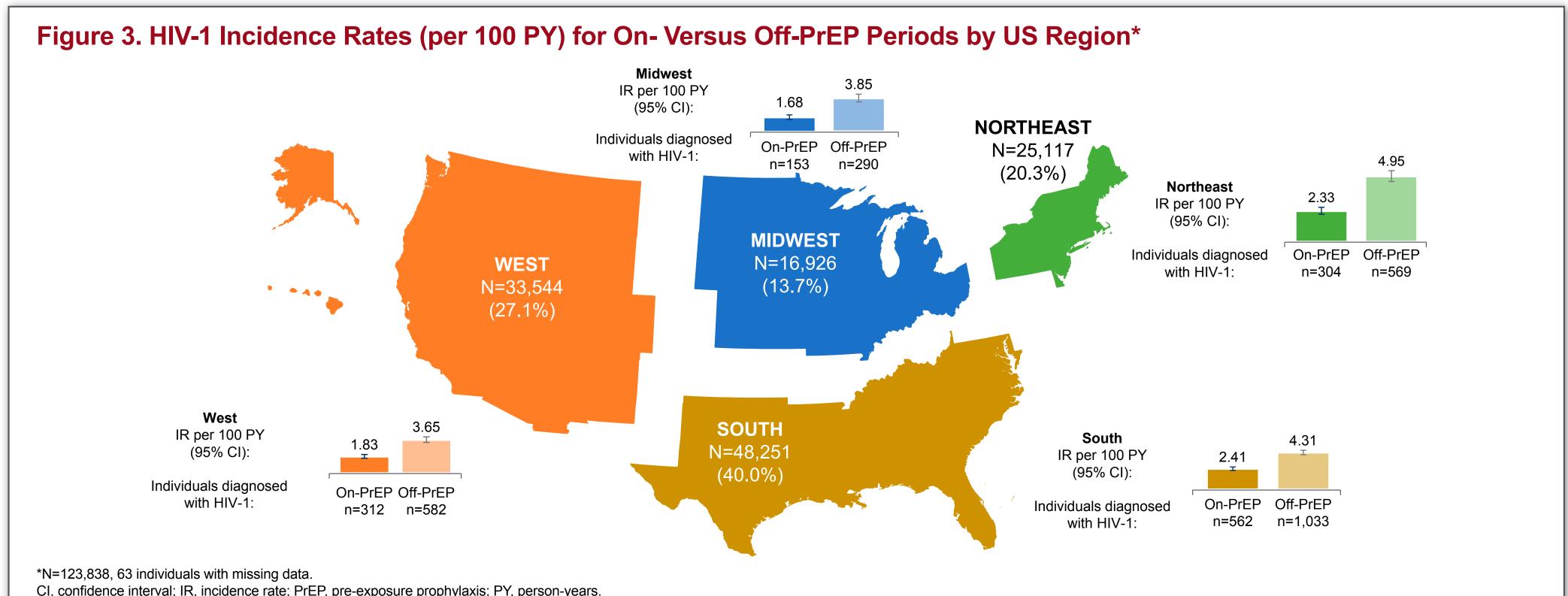
HIV-1 Incidence Rates by Age at First PrEP Claim (Figure 2)

• Differences between HIV-1 incidence rates during on- and off-PrEP periods did not vary by age



HIV-1 Incidence Rates by US Region (Figure 3)





Numbers Needed to Persist by US State (Figure 4) • US states with the lowest numbers needed to persist included: Alabama (n=31), Louisiana (n=32), Massachusetts (n=32), Illinois (n=32), and Georgia (n=35)

- US states with the highest numbers needed to persist included: Mississippi (n=160), Kansas (n=197), and Nevada (n=377)
- States with high numbers to persist indicate a need for additional resource to allocate to retaining people on PrEP and to prevent new HIV-1 infections

#### Long-Term HIV-1 Incidence Rate Trends (Figure 5)

#### IRRs of New HIV-1 Diagnoses Off- vs On-PrEP (Figure 6)

Of the individuals included in this analysis, 1343 were diagnosed with HIV-1 during on-PrEP periods (IRR: 2.15 per 100 PY

- [95% confidence intervals (CI): 2.04–2.27]) versus 2488 new diagnoses in those during off-PrEP periods (IRR: 4.22 per 100 PY [95% CI: 4.06–4.39]) • Overall, rates of off-PrEP periods were associated with a 2-fold higher risk in relative HIV-1 incidence rate compared with on-PrEP periods
- (IRR: 1.96 [95% CI: 1.84-2.10]) • When stratified by gender, the highest IRRs of new HIV-1 infection diagnoses during off-PrEP compared with on-PrEP periods were observed in cisgender men (2.26 [95% CI: 2.10–2.44]) and transgender women (3.64 [95% CI: 1.60–8.31])
- When stratified by US region, IRRs of new HIV-1 infection diagnoses for individuals during off-PrEP periods compared with on-PrEP periods were highest in the Midwest region (2.30 [95% CI: 1.89–2.79])
- By analysis of age at first PrEP claim, IRRs of new HIV-1 diagnoses for individuals during off-PrEP periods compared with on-PrEP periods were highest among the 25–34-year (2.19 [95% CI: 1.97–2.44]) and 35–44-year groups (2.17 [95% CI: 1.84–2.55])

### Figure 6. HIV-1 IRRs in Off- Versus On-PrEP Periods by Subgroups

		On-PrEP		Off-PrEP				
	Total N	HIV-1 Infection (n)	Person s Time (years)	HIV-1 Infections (n)	Person s Time (years)			IRR Off vs On PrEP (95% CI)
AII	123,901	1343	62,525.5	2488	58,973.4		i 🄶 i	1.96 (1.84–2.10)
Gender								
Cisgender men	107,082	1046	56,864.3	2010	48,289.3		H	2.26 (2.10–2.44)
Cisgender women	13,746	281	4214.6	432	9116.0	⊢∎→		0.71 (0.61–0.83)
Transgender men	1317	9	643.6	17	653.3	▶ <u></u>		1.86 (0.83–4.17)
Transgender women US Region	1755	7	803.0	29	913.8		<b>⊢</b>	→ 3.64 (1.59–8.31)
Northeast	25,117	304	13,058.0	569	11,491.5		<b>⊢-∰</b> 1	2.13 (1.85–2.45)
Midwest	16,926	153	9119.8	290	7527.1		<b>⊢</b> ∎4	2.30 (1.89–2.79)
South	48,251	562	23,288.8	1033	23,972.7		⊨ <b>≣</b> →	1.79 (1.61–1.98)
West	33,544	312	17,034.4	582	15,955.3		<b>⊢-≣</b> 1	1.99 (1.74–2.29)
Age at First PrEP Claim (years)	•		,		,			
18–24	27,655	277	11,965.5	562	15,198.5		⊨₋∎₋⊣	1.60 (1.38–1.84)
25–34	49,846	511	25,484.7	1027	23,373.1		H <b></b>	2.19 (1.97–2.44)
35–44	22,394	226	12,023.3	405	9932.8		<b>⊢⊞</b> 1	2.17 (1.84–2.55)
45–54	13,952	160	7585.6	248	6108.9		<b>⊢</b> ∎I	1.92 (1.58–2.35)
55+	10,054	169	5466.4	246	4360.2		<b>⊢∰</b> 4	1.82 (1.50–2.22)

CI, confidence interval: IRR, incidence rate ratio: PrEP, pre-exposure prophyla

## Limitations

### Limitations

- Data collection based on pharmacy claims may lead to the omission of clinically-relevant data in real-world settings
- Individual-level PrEP use patterns and adherence were not available in claims-based real-world data; moreover, on-versus off-PrEP periods are used as a surrogate for persistence
- This analysis examines HIV-1 incidence for up to 12 months of follow-up only
- The criteria used to identify PrEP users and HIV-1 cases could result in overestimation of HIV-1 incidence rates; however, sensitivity analyses using more conservative identification criteria revealed similar IRRs and demographic associations (data not shown)