Sexually-Transmitted Infection Testing & Positivity among Adults Receiving HIV Pre-Exposure Prophylaxis within an Integrated Health Care Delivery System in the United States

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ABSTRACT

Introduction

The goal of this project was to assess the frequency of sexually-transmitted infection (STI) testing and positivity among adult individuals receiving HIV Pre-Exposure Prophylaxis (PrEP) within Kaiser Permanente Northwest (KPNW).

Methods

We identified KPNW members, 18 years of age and older, who initiated PrEP with (tenofovir+emtricitabine) from January 1, 2015 – December 31, 2018. Using data elements abstracted from the electronic health record and billing claims, we assessed the rate of testing and positivity for HIV, gonorrhea, and chlamydia within a window around 120 days after initiation of PrEP.

Results

Overall, 685 members initiated PrEP during our study period, 661 (96.5%) of whom were male and 24 (3.5%) were female. By age, the highest proportion was among those 25-34 (241; 35.2%), 35-44 (186; 27.2%); 45-54 (120; 17.5%), 18-24 (65; 9.5%); 55-64 (57; 8.3%), and 65+ (16; 2.3%). Of those initiating PrEP, 460 (67.1%) remained continuous users for 120 days (median age 37) and 225 (32.8%) discontinued (median age 33). Of continuous users, 78.3% were tested for chlamydia and gonorrhea, with 6.9% and 6.7% testing positive, respectively. Of those discontinuing, 39.6% were tested, with 10.1% testing positive for chlamydia and 9.0% testing positive for gonorrhea. We identified three individuals who tested positive for HIV after PrEP initiation, but further chart review indicated these infections occurred after they discontinued PrEP.

Discussion

Our findings indicate a lower proportion of STI prevalence among continuous users of PrEP, compared to those who discontinue use. However, these differences may be impacted by differential STI testing between the two groups. Further work is needed to assess the overall impact of PrEP use and STI positivity, adjusting for testing.

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Background

- The Centers for Disease Control and Prevention recommends HIV Pre-Exposure Prophylaxis (PrEP) for the prevention of HIV acquisition among high-risk individuals.
- Included among the guidelines are recommendations for bacterial sexually-transmitted infection (STI) screening at the initiation of PrEP and at least semi-annually.
  - Screening for pharyngeal and rectal gonorrhea and chlamydia (G+C) infection is also recommended for those with relevant exposure.
- Yet, STI testing and positivity rates among individuals receiving PrEP remains limited.
- The aims of this study were to:
  - Describe the demographic characteristics of adults initiating PrEP within a large integrated health care delivery system;
  - Describe the frequencies of STI testing and positivity at PrEP initiation and at roughly 120 days post-initiation; and
  - Calculate and describe health care system expenditures among PrEP initiators.

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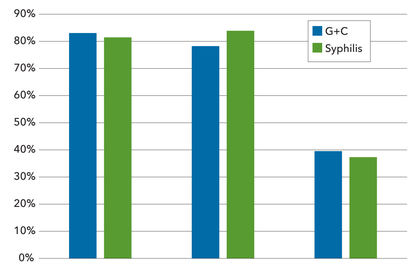
Methods

- We included adult members of Kaiser Permanente Northwest (KPNW) who initiated PrEP (tenofovir+embtricitabine) from Jan 1, 2015 – Dec 31, 2018.
- We observed initiators from 90 days prior to, to 165 days post, initiation. We assessed initial STI screening within the 90 days prior to initiation and follow-up STI screening from day 75 to day 165 post-initiation.
- We defined **continuous users** as members with >120 days-supply post-initiation with no gap in supply of >14 days; we defined those not meeting these criteria as **discontinuers**.
- We electronically abstracted demographic (age, administrative sex, race/ethnicity, and insurance payor); laboratory testing data; and health care utilization from the electronic health record (EHR).
  - We conducted manual chart review for all individuals testing HIV+ after initiation to determine whether exposure and/or seroconversion occurred during PrEP.
- We used a standardized relative resource cost algorithm to calculate cost estimates based on the Centers for Medicare & Medicaid Services (CMS) reimbursement framework.
- We calculated total medical expenditures, as well as costs specific to outpatient, inpatient, pharmacy, and laboratory services separately. Pharmacy expenditures where further categorized into services specific to PrEP
- We regressed expenditures on continuation status (1=continuous users, 0=discontinuers) using generalized linear models with a gamma distribution and log link to best accommodate the distributional properties of expenditure data. Each expenditure outcome was modeled separately; and adjusted p-values included adjustment for age, gender, and insurance type.
- Study protocol was reviewed and approved by the KPNW Institutional Review Board (FWA 000002344)

Table 1: Demographic characteristics of HIV PrEP initiators, and continuous users and discontinuers at 120 days.

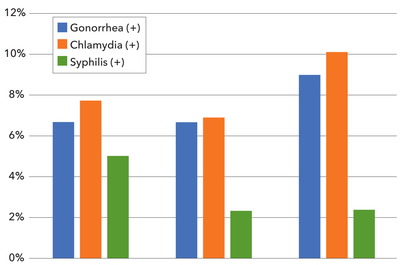
	All PrEP Initiators		Continuous Users		Discontinuers		OR (95% CI)
	N	Col %	N	Col %	N	Col %	
OVERALL	685	100.00%	460	100.00%	225	100.00%	
SEX							NS
F	24	3.50%	10	2.17%	14	6.22%	
M	661	96.50%	450	97.83%	211	93.78%	
RACE/ETHNICITY							NS
Hispanic, any	82	11.97%	52	11.30%	30	13.33%	
Non-Hispanic White	498	72.70%	337	73.26%	161	71.56%	
Non-Hispanic Black	26	3.80%	18	3.91%	8	3.56%	
Non-Hispanic Asian	31	4.53%	21	4.57%	10	4.44%	
Non-Hispanic Other	20	2.92%	13	2.83%	7	3.11%	
Not specified	28	4.09%	19	4.13%	9	4.00%	
AGE							
18-24	65	9.49%	30	6.52%	35	15.56%	0.5 (0.3, 0.9)
25-34	241	35.18%	153	33.26%	88	39.11%	REF
35-44	186	27.15%	136	29.57%	50	22.22%	1.6 (1.0, 2.4)
45-54	120	17.52%	90	19.57%	30	13.33%	1.7 (1.1, 2.8)
55-64	57	8.32%	43	9.35%	14	6.22%	1.8 (0.9, 3.4)
65+	16	2.34%	8	1.74%	8	3.56%	0.6 (0.2, 1.6)
PAYOR							
Medicaid	71	10.36%	46	10.00%	25	11.11%	0.8 (0.5, 1.4)
Medicare	17	2.48%	5	1.09%	12	5.33%	0.2 (0.07, 0.6)
Commercial	597	87.15%	409	88.91%	188	83.56%	REF

Figure 1: Proportion of PrEP initiators, continuous users, and discontinuers screened for Gonorrhea and Chlamydia (G+C) and Syphilis[1]



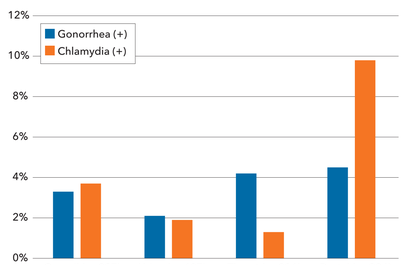
[1]Screening window defined as within the 90 days prior to PrEP initiation for All Initiators; days 75-165 for continuous users and discontinuers

Figure 2: Proportion of screened PrEP initiators, continuous users, and discontinuers testing positive for gonorrhea, chlamydia, and syphilis[1]



[1]Screening window defined as within the 90 days prior to PrEP initiation for All Initiators; days 75-165 for continuous users and discontinuers

Figure 3: Proportion of all specimens testing positive for gonorrhea and chlamydia, by anatomical site, from among PrEP continuous users at 120 days



Results

- We identified a total of 685 individuals who initiated PrEP during the study period **(Table 1)**, including 460 individuals (67%) remained continuous PrEP users at 120 days and 225 (33%) who had discontinued use.
  - Those 18-24 and those covered under Medicare were less likely to continue than older individuals and those on a commercial-funded plan.
- We observed no HIV seroconversions among PrEP initiators, while receiving PrEP.
  - Two tested HIV+ after initiation, but exposure and seroconversion occurred after PrEP discontinuation.
- Within the initial testing window:
  - 684 (100%) individuals were tested for HIV, 646 (94%) for serum creatinine levels, and 366 (53%) for hepatitis B virus prior to initiating PrEP.
  - Additionally, over 80% were tested for syphilis and G+C prior to initiating PrEP **(Fig 1)**.
  - The proportion positive for syphilis, gonorrhea, and chlamydia depicted **Fig 2**.
  - Among all individuals with a bacterial STI screening test, we found no significant differences in sex, age, race/ethnicity, and payor status between those who tested positive and those who tested negative (data not shown).
- During the follow-up testing window:
  - Roughly 80% of continuous users were screened for syphilis and G+C, while roughly 40% of discontinuers were screened, respectively **(Fig 1)**
  - The proportions of those testing positive for gonorrhea and chlamydia were higher among discontinuers than among continuous users; we observed a similar proportion testing positive for syphilis among both groups **(Fig 2)**.
- A total of 887 specimens were obtained from the 360 continuous users receiving G+C screening during the follow-up window. The distribution of these specimens, by anatomical site, and proportion positive is shown in **Fig 3**.
- Mean health care system expenditures for continuous PrEP users were significantly higher than those seen among discontinuers **(Table 2)**.
  - This association was seen across all expenditure categories and held when adjusted for age, sex, and insurance type.

Table 2: Mean health care expenditures of PrEP continuous users and discontinuers at 120 days[1]

Expenditure Category	Continuous Users		Discontinuers		p-value	Adjusted p-value
	Mean	SD	Mean	SD		
Outpatient	$1,365	$2,126	$1,146	$1,817	0.086	0.037
Inpatient	$370	$4,506	$131	$1,390	<.0001	0.026
Pharmacy	$11,037	$2,700	$5,307	$4,301	<.0001	<.0001
PrEP-related	$10,637	$2,053	$4,717	$3,435	<.0001	<.0001
Laboratory	$268	$248	$230	$344	0.0612	0.028
Total	$13,043	$6,160	$6,846	$5,286	<.0001	<.0001

[1]Cost expenditures captured up to day 165 post-initiation to account for testing window

Discussion

- Our results demonstrate a high level of screening for bacterial STIs at PrEP initiation and during follow-up testing for continuous users, likely associated with the receipt of HIV PrEP prescription refills.
- Although not powered to detect differences in positivity between time periods, our results suggest PrEP use may not be associated with increased STI positivity.
- Importantly, our results highlight the importance of conducting pharyngeal and rectal STI screening to detect infections and reduce further transmission.
- Higher mean expenditures among continuous users is not unexpected given the compliance with PrEP, however, the finding and its consistency across categories of expenditures signals the importance of future research. This may be a signal related to access and/or barriers to health care services or to factors influencing patient engagement with HIV PrEP care management plans.

Conclusion

STI screening should continue to be encouraged as part of a comprehensive HIV PrEP care management program.