

Use of HIV pre-exposure prophylaxis among men who have sex with men: low uptake and retention despite high-risk indications

HIV pre-exposure prophylaxis (PrEP) is highly effective in preventing HIV infection. Despite increasing PrEP prescriptions in Canada, barriers like cost, perceived risk, adherence issues, and stigma continue to hinder its use, and many individuals with objective risk factors for HIV do not perceive themselves as at risk or fail to engage with PrEP. This applies to all populations with higher rates of HIV, including gay, bisexual, and other men who have sex with men (gbMSM). To improve access to PrEP in Ottawa, a team of nurses at Ottawa Public Health and the University of Ottawa developed PrEP-RN.

Between August 2018 and November 2022, a total 1,181 high-risk gay, bisexual, and other men who have sex with men (gbMSM) were offered a referral to initiate PrEP. Of this total, 433 accepted and 307 presented to the initial PrEP intake visit, 246 received a prescription, and 137 patients remained engaged in care at 6 months. The research team found that patients under 30 were less likely to attend the PrEP

intake visit, less likely to initiate PrEP, and less likely to remain engaged in care. However, patients who were referred to PrEP-RN because of a positive STI diagnosis were more likely to start PrEP, and most importantly those who attended the PrEP-RN clinic were more likely to start PrEP compared to those seen at an infectious disease clinic.

This tells us that even though PrEP is highly effective, it only works if there is uptake among persons with risk factors for HIV acquisition. To achieve this, we must understand and create novel solutions to how individuals perceive risk and the ongoing barriers to access as well as how these factors vary between at-risk groups.



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Use of HIV pre-exposure prophylaxis among men who have sex with men: low uptake and retention despite high-risk indications

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ABSTRACT

HIV PrEP is over 99% effective in preventing HIV when medication adherence is high. Despite this, uptake and retention in PrEP care remains less than optimal. We investigated whether gbMSM with objective risk factors for HIV who were automatically offered PrEP would have higher uptake and retention in PrEP care. For this, gbMSM with clinical evidence of HIV risk received a reflexive offer for PrEP from a nurse. The number of offers, referral acceptance, presentation to the first appointment, initiation and retention at 6 months were examined. Of 1181 gbMSM with objective HIV risk factors who were offered PrEP, only 50% accepted, 28% initiated and 16% remained on PrEP at 6 months. Loss across the cascade was more pronounced for youth. We found a notable disconnect between recent STI diagnosis and acceptance, initiation and retention in PrEP. This notwithstanding, 137 at-risk individuals were retained on PrEP because of an active offer. PrEP delivered by nurses was as effective as that delivered by infectious disease physicians. While active offer PrEP successfully brought at-risk individuals into care, more work is required to understand the perceptions of risk, the benefits and challenges of PrEP use, and how stigma and structural barriers affect retention among diverse groups affected by HIV.

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Background

HIV pre-exposure prophylaxis (PrEP) refers to the use of antiretroviral medications, specifically oral co-formulated tenofovir and emtricitabine or injectable long-acting cabotegravir, to reduce the likelihood of HIV acquisition by HIV-negative persons at ongoing risk of infection (Tan et al., 2017). Four randomized controlled trials, as well as numerous cohort studies, have demonstrated that PrEP is over 99% effective at preventing HIV infection when medication adherence is high (Grant et al., 2010; 2014; Grulich et al., 2018; Landovitz et al., 2021; McCormack et al., 2016; Molina et al., 2015). Given its efficacy, PrEP is especially recommended for at-risk individuals within populations with increased HIV prevalence. In Canada, PrEP has been mostly targeted toward gay, bisexual, and other men who have sex with men (gbMSM), who continue to account for the highest rates of new HIV diagnoses each year (PHAC, 2023; Tan et al., 2017).

Since Health Canada approved co-formulated tenofovir and emtricitabine for HIV prevention in 2016, the number of individuals taking PrEP has

grown steadily. In Ontario, Canada's most populous province, rates of PrEP dispensing increased from 1451 prescriptions in 2016 to 11,042 prescriptions dispensed by the end of 2021, with over 97% of these prescriptions having been made to persons who identified as male (OHESI, 2023). In Ottawa, Ontario's second largest city, PrEP dispensing reached 91.4 per 100,000 persons in 2021 (OHESI, 2023) with an increase in the PrEP-to-need ratio from 5.1 in 2018 to 35.7 in 2021 (Kroch et al., 2023; OHESI, 2023).

Despite these increases in uptake, many individuals at risk of HIV infection still do not avail themselves of PrEP. In each of Canada's three largest metropolitan centers, only a third or fewer gbMSM with documented risk factors for HIV acquisition reported ever taking PrEP (Doyle et al., 2023; Sang et al., 2022). While structural barriers to access have been a consistent obstacle to PrEP rollout (Krakower et al., 2014; Mayer et al., 2018; Mizuno et al., 2022; Pinto et al., 2018; Pleuhs et al., 2020), numerous patient factors also influence interest in and willingness to use PrEP. Chief among these, as might be anticipated, is

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an individual's self-perceived risk of HIV infection. Several studies have shown regardless of objective risk factors, gbMSM who feel at risk are more likely to use PrEP than those who feel they are not at risk (Herder et al., 2020; Pico-Espinosa et al., 2023). In addition, at-risk gbMSM who are younger (less than 25 or 30 years of age) as well as those with lower incomes and men who identify as bisexual are all less likely to report using PrEP (Holt et al., 2023; Sang et al., 2022). Other reasons for not using PrEP have included cost, difficulties adhering to a daily pill regimen, concerns about medication side-effects, and PrEP stigma relating to the presumption that PrEP use leads to reckless or promiscuous behavior (Mansergh et al., 2023; Mehrotra et al., 2021; Pico-Espinosa et al., 2023; Zhang & Liu, 2022).

To better conceptualize these obstacles and their inter-relatedness, several authors have described the PrEP care continuum or PrEP cascade (Kelley et al., 2015; Moskowitz et al., 2021). In this model, to achieve protection from HIV, an at-risk individual must perceive themselves to be at risk, see PrEP as a tool to reduce that risk, consider PrEP acceptable in terms of risk-benefit, have access to a PrEP prescriber, receive a prescription for PrEP, have a means to pay for PrEP, and finally take and adhere to the medication and with follow up. The first step in the continuum, self-perceived risk of HIV infection, is of particular interest given the documented discordance between self-perceived risk and risk assessed on behavioral and epidemiologic grounds. For example, among 249 gbMSM in Toronto who scored ≥ 10 on the HIV Incidence Risk Index for MSM (HIRI-MSM), only about a third (31.7%) felt they were at moderate to high risk of HIV infection (Wilton et al., 2016). Similarly, Pico-Espinosa et al. (2023) found that among 315 gbMSM living in Ontario and British Columbia with low self-perceived risk of HIV infection, nearly half (46%) were considered high risk based on PrEP guidelines. Overall, it appears anywhere from 28-56% of gbMSM with objective risk factors for HIV acquisition decline PrEP due to low self-perceived risk (Lions et al., 2023; Mehrotra et al., 2021; Orser & O'Byrne, 2024).

In view of this, we questioned whether individuals when presented with objective risk factors for HIV infection such as a diagnosis of rectal gonorrhea or Chlamydia or a recent diagnosis of syphilis would perceive themselves to be at risk and so show a higher uptake of PrEP and engagement along the care continuum. In 2018, research clinicians from the School of Nursing at the University of Ottawa collaborated with Ottawa Public Health to implement a nurse-led active

offer PrEP referral process, entitled PrEP-RN, where the active offer is based on high-risk clinical indicators for HIV infection. Through this process, any individual with a high-risk indicator was automatically offered a referral to a PrEP provider (O'Byrne et al., 2019). For these individuals, we also examined whether the reason for PrEP referral or type of clinic where PrEP was prescribed was associated with PrEP retention.

Methods

PrEP-RN referral process

Beginning in 2018, we implemented PrEP-RN, an identification and referral system for PrEP within our public health unit (Ottawa Public Health). Here, Public Health nurses working in sexually transmitted infection (STI) follow-up or in the sexual health clinic reflexively offered PrEP referrals to persons with high-risk indicators for HIV acquisition (Table 1). High-risk indicators based on guidelines (type 1 criteria) included a diagnosis of rectal Chlamydia or gonorrhea, infectious syphilis or lymphogranuloma venereum, sexual contact with a person with transmissible HIV, or the use of HIV post-exposure prophylaxis (PEP) (O'Byrne et al., 2019; Tan et al., 2017). Additional high-risk indicators (type 2 criteria) included a diagnosis of non-rectal sexually transmitted infection, a history of multiple STIs, injection drug use and/or sexualized drug use, and condomless sex with multiple partners within the gbMSM population. Those who met the foregoing criteria (type 1 or type 2) were offered a referral to a dedicated PrEP clinic, either a nurse-led service within the sexual health clinic or one of three clinics each led by an infectious diseases specialist. Patients could access all clinics for free through Ontario's government health insurance plan. Those who did not have government insurance (newcomers, those from another province) could access

Table 1. High-risk indicators for HIV acquisition.

TYPE 1 CRITERIA
Diagnosis (1 or more infections)
• Rectal chlamydia or gonorrhea
• Infectious syphilis
• Lymphogranuloma venereum
Exposure
• Sexual and/or needle sharing exposure to person with transmissible HIV
• Post-exposure prophylaxis use
TYPE 2 CRITERIA
• Non-rectal STI (pharynx or genitals)
• History of multiple STI diagnoses
• Report of injection drug use or sexualized drug use
• gbMSM with multiple sex partners

the nurse-led PrEP program at the sexual health clinic for free which also uniquely provided 3-months free medication to participants who did not have medication insurance. Only those individuals who received an active offer for PrEP referral based on objective risk factors were included in this study. Those who presented to care seeking PrEP were not included.

PrEP cascade

The PrEP cascade is a framework to measure trends in PrEP referrals and acceptance and PrEP delivery to persons at risk for HIV acquisition (Zhang et al., 2019). Considering that gbMSM accounted for the highest proportion of new HIV diagnoses and that most persons who currently use PrEP in Ontario identify as male, we selected this group for analysis. For this study, we used an adapted version of the PrEP cascade using the categories in Figure 1 (Dashwood et al., 2020): For PrEP referrals, we examined (1) the number of referrals offered to high-risk gbMSM; (2) which risk criterion the referral offer was based on; and (3) how many gbMSM with high-risk indicators accepted a PrEP referral and to which clinic. For PrEP delivery, of those who accepted a referral for PrEP, we examined (4) how many presented to their first appointment, (5) how many initiated PrEP, and (6) of those who initiated, how many remained on PrEP for at least 6 months.

Data collection

Each time a referral for PrEP was offered, nurses completed a data tracking sheet, including patient demographics and if the patient accepted or declined the offer. Referral data for those who accepted were logged in an Excel spreadsheet. For this study, we undertook a retrospective review of the PrEP cascade in Ottawa from 5 August 2018 to 6 November 2022. For the PrEP referral component of the cascade, we extracted data from the PrEP-RN log on the number of referrals made for gbMSM who met high-risk criteria, which indicators (type 1 or type 2) they were noted to have at the time of the referral (Table 1), and to which clinical site referrals were made. Separate lists were compiled based on referral location and securely faxed to each site. Participating clinics reviewed patient files

to obtain data on the PrEP delivery component of the cascade, including attendance of initial appointment, uptake of initial PrEP prescription, and retention in PrEP care for at least 6 months. Data from one infectious diseases clinic were not available. Data from the remaining clinics were entered into a PrEP cascade spreadsheet for analysis.

Data analysis

Patient demographics and data related to PrEP referrals and uptake, including identified risk factors, reason for referral, referral location, and uptake at the three points of PrEP delivery (intake appointment, initial prescription received, and retention in care on or after 6 months) were analyzed using descriptive statistics reporting on frequencies and percentages of uptake and use. Chi-square analyses were completed at each PrEP delivery phase of the cascade, evaluating uptake (did or did not attend) against reason for referral, referral location (nurse-led clinic or infectious diseases clinic), and age (under 30 years of age or 30 years of age and older, and under 25 years of age or 25 years of age and older). The different age categories were selected because the Public Health Agency of Canada defines youth as under 30 years of age, and in Ontario, persons who are under 25 years of age and have a provincial health card have access to free PrEP medication. Sub-analyses based on age were also completed for each phase of the PrEP delivery component evaluating attendance based on reason for referral and referral location. A priori, we set $p = 0.05$ to determine significance.

Ethics

Ethics approval for the PrEP-RN study was obtained from the Ottawa Public Health and University of Ottawa Research Ethics Boards (H-04-18-533), including data collection of PrEP offers and referrals and patient access and uptake in the PrEP-RN clinic. In addition, a research ethics exemption was obtained from the Ottawa Health Science Network Research Ethics Board as a “quality improvement, quality assurance and/or program evaluation initiative”. The PrEP-RN initiative was supported by the Ontario HIV Treatment Network under Grant number EFP-2017.

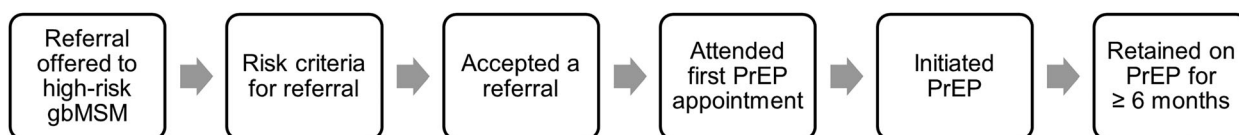


Figure 1. PrEP cascade pathway.

Results

PrEP referrals

From 5 August 2018 to 6 November 2022, a total of 1181 gbMSM who fulfilled high-risk criteria (type 1 or type 2) for PrEP initiation were identified and offered a referral to initiate PrEP. Of these, 493 accepted and 436 declined. The additional 252 were either currently on PrEP or were ineligible due to contraindications such as, a prior HIV diagnosis, allergy or medical contraindication to PrEP medications, or a lack of health insurance to cover services. Of the 493 persons who accepted a referral for PrEP, data were unavailable for 60 leaving 433 persons included in the analysis. These 433 patients had an average age of 31 years (range 17–72). Almost all (97%) identified as gay or a man who has sex with men while 3% identified as bisexual.

Among the 433 persons with high-risk criteria for PrEP and who accepted a referral, 74% ($n = 319/433$) were referred based on guideline indicators (type 1 criteria) and 26% ($n = 114/433$) of persons were referred based on a current or historical diagnosis of non-rectal STIs, injection drug use or engagement in sexualized drug use, or condomless sex with multiple partners within the gbMSM population (type 2 criteria). Among those who accepted a referral based on type 1 criteria, 24% ($n = 104$) had a rectal Chlamydia or gonorrhea infection, 23% ($n = 100$) had infectious syphilis, 5% ($n = 23$) had a rectal bacterial STI and syphilis co-infection, 3% ($n = 14$) had sex with an individual with transmissible HIV, and 18% ($n = 78$) had used HIV PEP. We noted no real differences between accepting or declining a PrEP referral according to high-risk criteria, except for those with a recent rectal STI diagnosis. Among the 436 who declined a PrEP referral, 17% ($n = 73$) had a rectal Chlamydia or gonorrhea infection, 30% ($n = 132$) had infectious syphilis, 4% ($n = 19$) had a rectal bacterial STI and syphilis co-infection, 3% ($n = 12$) had sex with an individual with transmissible HIV, and 16% ($n = 70$) had used HIV PEP. The remaining 30% ($n = 130$) were offered PrEP based on clinical judgment (type 2 criteria) and declined a referral.

In terms of referral location for those who accepted, 58% ($n = 253$) preferred a referral to the nurse-led PrEP program at the sexual health clinic and 42% ($n = 180$) selected one of the infectious diseases clinics. Among those who selected an infectious diseases clinic, all had medication insurance while among those who selected the nurse-led clinic, which provided subsidized medication, 30% had no insurance.

PrEP delivery

Of the 433 persons who accepted a PrEP referral, 71% ($n = 307$) presented for their initial PrEP intake visit. Of these 307, 80% ($n = 246$) completed baseline screening blood tests for PrEP initiation and received an initial prescription. Among the 246 persons who received a prescription, 56% ($n = 137$) remained engaged in PrEP care at 6 months. In the end, only 16% of gbMSM with a high-risk indicator for PrEP were retained in PrEP care after 6 months (Table 2; Figure 2). Retention improved to 33% ($n = 165$) when we included persons who completed a 4-month follow-up visit and received a 3-month prescription for PrEP, potentially extending PrEP use beyond 6 months, and those who remained engaged in care on or after 6 months but stopped and re-started PrEP at least once during the 6-month period.

PrEP cascade – sub-analysis

We next examined factors within the available dataset, specifically age, reason for referral and clinic setting, to determine if these influenced PrEP initiation and retention. Of the entire sample, those under 30 years of age compared to those 30 years of age and older were less likely to have attended their PrEP intake appointment ($p = 0.02$), less likely to have initiated PrEP ($p = 0.02$), and less likely to have remained engaged in care at 6 months ($p < 0.01$). Interestingly, this also held true comparing those younger than 25 years of age, all of whom with a government health card had free access to medication, to those 25 and older who would have needed a means to pay for PrEP. That is, those with free access to medication were still less likely to have attended an intake PrEP visit ($p = 0.01$), less likely to have initiated PrEP ($p < 0.01$) and less likely to have remained engaged in PrEP care at 6 months ($p = 0.01$).

In terms of initiating PrEP, those referred based on type 2 criteria were more likely to start PrEP compared

Table 2. PrEP cascade results.

	#	% retained from prior step	% retained from total identified ($n = 864$)	% retained from total accepted ($n = 433$)
Identified for PrEP	864			
Accepted a PrEP referral	433	50%	50%	
Attended intake appointment	307	71%	36%	71%
Initiated PrEP	246	80%	28%	57%
Retained at 6 months	137	56%	16%	33%

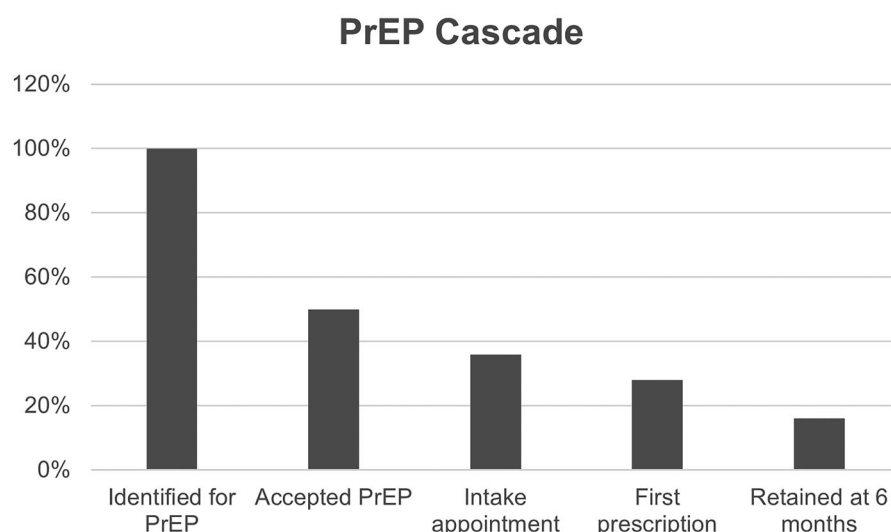


Figure 2. PrEP cascade: Retained from total identified.

to those referred according to guidelines (type 1 criteria; $p = 0.05$) and those who attended the PrEP-RN clinic were more likely to start PrEP compared to those seen at one of the infectious diseases clinics ($p < 0.01$). However, there were no significant differences in PrEP retention at 6 months comparing persons referred based on type 2 versus type 1 criteria and for persons who attended the nurse-led clinic versus an infectious diseases clinic.

Sub-analyses based on age revealed that youth under the age of 30 who attended the nurse-led clinic were more likely to initiate PrEP compared to those in this age group who were seen at an infectious diseases clinic ($p = 0.01$). However, no significant differences in initiation were noted between age groups based on reason for referral. Persons who were 30 years of age and older who were seen at the nurse-led clinic were more likely to have attended their initial PrEP appointment compared to those over 30 years who were seen by infectious diseases ($p = 0.04$) though this trend did not continue at additional points in the cascade. We did not note any significant differences in retention in care at 6 months among persons under or over the age of 30 based on reason for referral or clinical service type.

Discussion

Herein, we report on the PrEP cascade among a subset of high-risk gbMSM in Ottawa, Canada from 5 August 2018 to 6 November 2022. All gbMSM included in the study were identified based on objective criteria as being at risk of HIV infection and received a reflexive offer for referral to a PrEP clinic. All had access to free

medical care. All those under the age of 25 had free access to medication through the Ontario government plan and those over 25 without medication insurance had the option to receive PrEP free-of-charge through our nurse-led clinic. Overall, only about half of persons who were offered PrEP accepted a referral and about equal proportions selected referral to the nurse-led and an infectious diseases clinic. Of those who accepted a referral, just over half (57%) initiated PrEP and of those who initiated PrEP just over half (56%) remained on PrEP at 6 months. Persons less than 25 years of age were less likely to initiate PrEP or be retained in PrEP care at 6 months despite having free access to medication. And finally, although a greater proportion of people referred to the nurse-led clinic-initiated PrEP, we did not identify any differences in PrEP retention at 6 months based on whether services were provided by nurses or infectious disease specialists. These findings raise a few points for discussion.

First, drops at each stage of the PrEP cascade were steep, with only 16% of the 1181 gbMSM identified as at risk of HIV infection and only 33% of those who accepted a referral for PrEP remaining on PrEP at 6 months. These drops in the cascade were more pronounced for youth. Our findings align with the literature which has shown less than optimal uptake and retention in PrEP care among gbMSM. A 2020 study in New York City involving 1301 MSM attending STI clinics found that while 62% of patients accepted PrEP navigation, of these only 56% accepted a PrEP referral and only 11% initiated PrEP (Pathela et al., 2020). Similarly, an internet-based U.S. cohort study of 4229 PrEP-eligible men and trans individuals who

have sex with men found only 17% were taking PrEP after one year (Mehrotra et al., 2021). Another 2020 study in Thailand found that, among 6287 MSM and 900 transgender women, uptake was just below 50%, overall retention was less than one-quarter, and that there were lower rates of use and retention among youth (Ramautarsing et al., 2020). Finally, a systematic review of PrEP use by persons who inject drugs found uptake of only about 0–3% across 23 articles (Mistler et al., 2021). Our study is one of the first to highlight similar outcomes in Canada where there is free access to medical care. Further, free medication for individuals less than 25 years of age and access to free medication through our nurse-led clinic for those 25 and over also did not appear to increase initiation and retention outcomes.

We had hypothesized that, in contrast to other studies examining all comers including self-referrals for PrEP, gbMSM in our study when presented with objective evidence of their HIV risk such as a diagnosis of rectal gonorrhea or Chlamydia would perceive themselves to be at risk and so be more motivated to initiate and continue PrEP. This was not the case as only 50% of these cases accepted a referral to a PrEP provider and only 16% of the total remained engaged in PrEP at 6 months. In a similar vein, in a 2018 study from San Francisco, Hojilla et al. (2018) found of 344 gbMSM evaluated for PrEP, those with a diagnosis of rectal gonorrhea or Chlamydia or of syphilis at baseline were 44% less likely to be retained in PrEP care at 13 months. In addition, in a 2018 survey of 658 gbMSM in Sweden, self-reported rectal gonorrhea, rectal Chlamydia or syphilis diagnosis in the past year was not associated with an interest in taking PrEP (Herder et al., 2020).

This apparent disconnect between objective risk, including diagnoses of rectal STIs, and willingness to use PrEP raises concern. It is possible that the knowledge that PrEP is specific for HIV and does not prevent other STIs, gbMSM diagnosed with rectal gonorrhea or Chlamydia or with syphilis decline or are not interested in PrEP and instead change behaviors or opt for other risk reduction strategies such as consistent condom use. While this may well be the case for some, we have previously shown of 439 at-risk gbMSM identified by PrEP-RN who were offered a PrEP referral and refused, 236 (54%) presented more than once with ongoing risk factors prompting multiple offers for PrEP. Of these, 5 seroconverted to HIV positive during the study period (Orser & O’Byrne, 2024). It is also possible that the steep decline in PrEP use throughout the cascade might relate to contextual factors surrounding risk.

Qualitative research involving MSM who accessed HIV post-exposure prophylaxis (PEP) found that their decisions to access HIV prevention services related less to risk and more to what they described as an atypical sexual encounter with an atypical sexual partner, which led to feelings of distress about a potential HIV exposure that were only assuaged by initiating PEP (O’Byrne et al., 2018). We speculate these findings could also apply to decision-making around HIV PrEP use among MSM – where perceived need for PrEP might feel higher after an unexpected event, such as an STI diagnosis or potential exposure to an individual with transmissible HIV. The manner in which gbMSM conceive of, and the information they use to assess, their HIV risk warrants exploration.

Notwithstanding the high rate at which participants in our study declined and discontinued PrEP, a 16% retention rate overall is a positive finding. Indeed, this corresponds to 137 people with objective risk factors for HIV acquisition who did not seek PrEP but initiated and continued this intervention because of an active offer from a sexual health nurse. Given that the Centers for Disease Prevention and Control estimates an HIV diagnosis rate of approximately 1 in 12 to 1 in 15 for gbMSM diagnosed with syphilis or rectal gonorrhea or chlamydia, our active offer PrEP program may have averted 8 to 11 HIV infections in this group (Centers for Disease Prevention and Control, 2021). While we strongly advocate for education and awareness campaigns to promote PrEP, these alone may not be sufficient and proactive offers to engage individuals at risk of HIV in PrEP care should become routine among healthcare professionals.

In terms of preferred settings to deliver PrEP, our results did not highlight any real differences between our nurse-led clinic and infectious diseases specialists. An equal proportion of participants selected referral to both settings and we did not identify any significant differences in the rates of PrEP retention at 6 months between the two types of clinics. There were also no differences in age for persons who selected either of the two service delivery models in terms of retention. This clearly supports the important role nurses can play in the delivery of PrEP (Orser et al., 2023; Schmidt et al., 2018), in their ability to engage and retain patients in care and their role as interdisciplinary PrEP providers. We feel our results support the need for multiple service delivery models for PrEP, and the benefits of interdisciplinary healthcare teams in delivering PrEP services to gbMSM.

Considering that we did not identify differences in PrEP uptake or use in relation to risk factors, healthcare access, provider type, or cost (including free

medications for those 25 and under or without insurance), we surmise that there must be other factors that are constant between the comparator PrEP delivery models we evaluated which consequently undermined retention in PrEP care. One possibility is that daily oral medication use and clinical follow-up every 3 months to obtain prescriptions was an outright barrier (Tan et al., 2017). People may find the required work to obtain PrEP to be unreasonable or disproportionate to benefits they receive from using this intervention – particularly during periods where perceived risk of HIV exposure is low (as was observed in our HIV PEP study) (O’Byrne et al., 2018). Evaluations of injectable PrEP – as the latest intervention – to determine retention will shed some light on this hypothesis. Another possible exploration would be to lengthen the duration between PrEP follow-up appointments for oral medications, perhaps to every 4–6 months to determine if fewer appointments coincide with better rates of ongoing PrEP use. In all cases, future research is required.

Despite these speculations, our data add to the growing body of literature highlighting gaps in our understanding of HIV risk perception, individual preferences in selecting risk reduction strategies, and structural barriers to ensuring those strategies are easily accessible. Exploratory and intervention research on PrEP perceptions, uptake and retention are required. While our active offer nurse-led referral process for PrEP removed many barriers including patient awareness, patient hesitancy, clinic accessibility, provider availability and medication cost, over half of our at-risk participants still declined PrEP and the same proportion discontinued after initiation. A deeper exploration is needed.

Limitations

Our findings are subject to some limitations. First, data were not available for 60 of the 493 patients (13%) who accepted a referral for PrEP. While including these patients may have influenced our results, we are not aware of any significant differences between the infectious diseases (ID) clinic where these patients were referred and the other two ID clinics. Second, our analysis is limited to gbMSM and so do not reflect uptake, retention or outcomes for other at-risk populations such as members of Indigenous communities and persons of African, Caribbean, or Black ethnicities. Research is needed to expand our understandings about the PrEP cascade to include representation of the diverse groups that are affected by HIV. Lastly, our study was carried out in one city in Ontario,

Canada with a population of approximately 1 million residents. While it may not be possible to extrapolate our data to other settings, we note our findings do align with the international literature suggesting our results may well be broadly applicable.

Conclusions

PrEP is an HIV prevention strategy that can reach 99% efficacy among individuals at risk. In order to benefit from this opportunity at both the individual and population levels, however, persons at risk must first perceive themselves to be at risk, view PrEP as an acceptable intervention, have access to a PrEP provider and to medication, and remain engaged in ongoing PrEP use. We found here that among 1181 gbMSM with objective risk factors for HIV acquisition who automatically received a referral to a PrEP provider, only 50% accepted the referral, 28% initiated PrEP and 16% remained on PrEP at 6 months. Loss across the cascade was more pronounced for youth under 30 years of age as well as those under 25 despite the latter group having free access to medication. While individuals less than 30 years of age seen at our nurse-led clinic were more likely to start PrEP compared to individuals in this age group seen in an infectious diseases clinic, we found no other significant differences in terms of uptake or retention based on clinic setting. Consistent with other studies, we saw a notable disconnect between the presence of objective risk factors for HIV acquisition such as a diagnosis of rectal gonorrhea or Chlamydia or a diagnosis of syphilis and acceptance, initiation and retention in PrEP. Notably, the reduced uptake of PrEP seen here does not appear to be associated with changes in behavior or selection of alternate prevention strategies as we have previously shown half of those who declined an offer for PrEP referral presented more than once with ongoing risk factors prompting multiple PrEP offers and subsequent HIV seroconversions. Our findings emphasize the benefit of an active, reflexive offer for PrEP to individuals at risk. While overall PrEP acceptance and retention rates here were low, those who did initiate and remain on PrEP did so because it was offered to them by a sexual health nurse. We also note PrEP delivered by nurses in our nurse-led clinic was as effective in uptake and retention as that delivered by infectious diseases physicians indicating a clear role for other healthcare providers and an interdisciplinary approach in the delivery of PrEP.

Our findings here highlight that while PrEP is highly efficacious in preventing HIV transmission,

the effects of this intervention will be muted as long as uptake and retention remain relatively low. More work is required to understand how individuals understand and perceive HIV risk, how they weigh the benefits and challenges of PrEP, how stigma and structural barriers affect retention in PrEP care and, importantly, how these factors vary between the diverse groups affected by HIV. Only then will the full benefits of PrEP be realized.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

Data cannot be shared publicly because of concerns of compromising patient safety and confidentiality.

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