

Assessing the Potential for Nurse-Led HIV Pre- and Postexposure Prophylaxis in Ontario

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Abstract

Background and purpose: HIV prevention efforts in Ontario require increased implementation of strategies including post- and pre-exposure prophylaxis. Access to these interventions could be improved by their provision through nurse-led models of care. We assessed nurses' readiness to deliver these interventions using a behavioral change framework.

Methods: We distributed an online survey to nurses in every Ontario sexual health clinic, HIV clinic, and community health center between March-June 2018, to determine the level of support for nurse-led postexposure prophylaxis/pre-exposure prophylaxis; we also explored nurses' "capabilities," "opportunities," and "motivations" for providing postexposure prophylaxis/pre-exposure prophylaxis.

Results: Overall, 72.7% of respondents supported implementation of both nurse-led postexposure prophylaxis and pre-exposure prophylaxis. More experienced nurses were less likely to support nurse-led postexposure prophylaxis and pre-exposure prophylaxis (adjusted odds ratio = 0.55 per decade nursing, 95% confidence interval (0.37, 0.82)). Nurses reported a high degree of knowledge of topics related to postexposure prophylaxis/pre-exposure prophylaxis, with the exception of creatinine interpretation.

Conclusions: Ontario nurses report high levels of support for nurse-led postexposure prophylaxis and pre-exposure prophylaxis and are well positioned to provide these interventions. Targeted education and implementation efforts are needed to engage these nurses in postexposure prophylaxis and pre-exposure prophylaxis delivery.

Keywords

Behavior change, HIV prevention, implementation science, nursing

Background and purpose

Despite sustained HIV prevention efforts based on behavior change and condom use, Ontario has seen more than 700 new infections annually over the last 10 years (Wilton et al., 2017). The financial cost of HIV infection (the lifetime cost for an individual infected at the age of 35 years was recently estimated at US \$326,500) (Schackman et al., 2015) and the young age of Ontarians newly diagnosed (most new infections occurring in those aged 25 to 35) (Wilton et al., 2017) further underscore the economic and social importance of preventing new infections.

Growing global consensus is that an approach combining multiple strategies is key to controlling the HIV epidemic, including pre- and post-exposure prophylaxis (PrEP and PEP). PrEP is the use of the antiretroviral

drugs (ARVs) tenofovir disoproxil fumarate (TDF) plus emtricitabine (FTC) to prevent infection in HIV-uninfected individuals with high ongoing risk. PrEP is

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recommended by national and international guidelines, including by the World Health Organization (European AIDS Clinical Society, 2017; D. H. S. Tan et al., 2017; U.S. Preventive Services Task Force, 2019; World Health Organization, 2015; Wright et al., 2018). PEP is a related intervention involving 28 days of certain ARVs immediately after an HIV exposure. Recommended PEP regimens in Canada include TDF/FTC plus a third ARV, raltegravir, dolutegravir, or darunavir (D. H. S. Tan et al., 2017). Modeling data suggest that widespread implementation of PrEP along with other biomedical prevention strategies could decrease new HIV infections by 95% (Zablotska, 2017).

Several implementation challenges have limited the clinical and public health impact of these interventions in Ontario. Currently, PrEP/PEP is prescribed in a “centralized” way, meaning by a limited number of HIV specialists. It is estimated that over 30,000 individuals in Ontario meet guideline indications for PrEP, but only approximately 4000 are currently receiving it, despite the availability of generic TDF/FTC and this medication’s listing on the Ontario Drug Benefit in September of 2017 (D. Tan et al., 2019). This approach is inadequate to meet the growing demand for PrEP/PEP, is costly, and detracts from these specialists’ ability to care for those already living with HIV.

To deliver these interventions on the scale needed to achieve public health impact, it is important to explore the decentralization of PrEP/PEP delivery by harnessing the skills of additional health-care providers, including nurses. Delivery of both PEP and PrEP are well suited to the skills and expertise of nurses working in public health units, sexual health clinics, community health centers, and HIV clinics. Many of these nurses perform delegated acts under medical directives, and many are already proficient in the clinical skills required to deliver PEP and PrEP. A 2013 Canada-wide survey of physicians found fewer than half felt that they personally had the knowledge required to prescribe PrEP (Sharma et al., 2014); however, little is known about nurses’ knowledge and willingness to act as PrEP and PEP providers, nor what their specific educational needs may be.

In this study, we administered a survey to Ontario nurses working in the abovementioned settings, with the primary aim of determining the level of support for nurse-led PEP and nurse-led PrEP provided under medical directives. We additionally aimed to identify variables predictive of support for nurse-led PEP and PrEP. Finally, we explored the potential for nurse-led PEP and PrEP using the COM-B behavioral change framework (Michie et al., 2011). This paradigm posits three types of influences upon behavior: “Capability,” which refers to an individual’s psychological and physical capacity to engage in an activity, including both knowledge and skill level; “opportunity,” which refers to structural

and environmental factors that may facilitate and/or hinder a behavior change; and finally “motivation,” which refers to the many personal processes that direct behavior, including attitudes, habits, and analytical decision-making. We explored each of these domains in order to determine the possible facilitators of and barriers to implementation of nurse-led PEP and PrEP.

Methods and procedures

Study design and population

We administered a 37-item online survey to Ontario nurses using the Hosted in Canada Surveys website between March 2018 and June 2018. Nurses working in a public health unit, sexual health clinic, community health center, or HIV clinic were eligible for participation. While we were primarily interested in support for registered nurse (RN)-led models of care, we did not restrict the survey to RNs, reasoning that nurse practitioners (NPs) and registered practical nurses may also have roles in these work settings and thus have relevant perspectives on this topic. To recruit participants, we contacted leaders within all known organizations from each of these categories in Ontario to describe study details and asked to circulate the electronic survey flyer, containing the survey link, to all applicable nurses within their organization. No prior knowledge of PEP/PrEP was required for participation. Upon survey completion, participants were given the option to enter a draw to win one of the three iPad minis or accept a US\$10 e-gift certificate as a token of appreciation for their involvement. These were distributed by the study coordinator to participant e-mail addresses which were not linked to study responses in order to keep them anonymous.

Objectives

The primary objective of our study was to determine the level of support among respondents for (a) nurse-led PEP and (b) nurse-led PrEP. Respondents were asked to respond “yes” or “no” to two separate questions: “Would you support the development of a process at your institution through which nurses could provide (PEP/PrEP) under a medical directive?” Respondent characteristics associated with support both were also identified. Secondary objectives were to characterize the existing capabilities, opportunities, and motivations of nurses around PrEP and PEP.

Survey instrument

We modified survey items from questionnaires previously administered to HIV care providers (Senn et al., 2013; Sharma et al., 2014; Yoong et al., 2016), to reflect the

target population of nurses. We complemented this content with additional items based on a review of relevant literature (Castel et al., 2015; Krakower & Mayer, 2012; Krakower et al., 2014). The survey included a mixture of multiple choice, Likert-type scale, and open-ended questions and was constructed systematically using the COM-B framework. The survey items sought to increase our understanding of these domains and were organized in the following way: (1) demographics and workplace characteristics, (2) knowledge and/or experience with PEP/PrEP including relevant clinical skills and learning needs (capabilities), (3) characteristics of the workplace including current barriers and facilitators for providing PEP/PrEP (opportunities), and (4) general attitudes and opinions on PEP/PrEP including how and who should deliver it (motivations). The survey was pilot tested on four Ontario nurses with past or current experience working in HIV and sexual health-care settings, to assess the clarity and appropriateness of the questions, and revised accordingly.

Analysis

We first characterized the study sample using descriptive statistics, including measures of central tendency for continuous data and frequencies/proportions for categorical values. Two reviewers analyzed qualitative responses to open-ended questions and then compiled a list of key themes by consensus. We reported the primary outcome variable as a proportion, that is, the percentage of respondents supportive of both nurse-led PEP and nurse-led PrEP.

Next, we built a multivariable logistic regression model to identify individual characteristics associated with support for nurse-led PEP/PrEP. Because support for PEP and PrEP were concordant for 89.7% of participants, we constructed only one model, for which the outcome was “support for both interventions.” The primary predictor of interest was working in a sexual health clinic because we hypothesized that support would be strongest in this setting. Variables initially considered for inclusion in the model were based on their theoretical association with the outcome. After removal of variables due to collinearity, the remaining variables were considered eligible for inclusion in the final model if they changed the beta coefficient for the primary predictor by >10% in a bivariate model. We then considered all possible combinations of remaining variables, and selected the multivariable model based on model fit using the Akaike information criterion, and restricting the total degrees of freedom based on the number of outcomes observed.

Finally, to address our secondary objectives, we used descriptive statistics to describe nurses' existing capabilities, opportunities, and motivations for providing PEP

and PrEP. Statistical analyses were performed using SAS version 9.4.

Sample size considerations

The target sample size for this study was based on the minimum number of participants required to estimate the proportion of Ontario nurses supporting the idea of nurse-led PEP/PrEP with reasonable precision. As there were no prior data on this proportion, we conservatively estimated the true value at 0.5, which maximizes the necessary sample size. Using a standard sample size formula for estimating a proportion (Naing et al., 2006), we determined that 150 participants would generate a sufficiently informative 95% confidence interval (CI) of $\pm 8.0\%$.

Ethical approval and consent

This study received approval by our institutional Research Ethics Board. Participants provided informed consent prior to survey initiation. Participant responses were anonymized.

Results

We distributed surveys to nursing leaders at a total of 57 practice locations, and surveys were in turn distributed to a total of 470 individual nurses. Overall, 214 individuals initiated the survey (45.6% response rate) of which 165 (77.1%) provided responses to the primary outcome questions and were included in the analysis. Table 1 provides a summary of participant demographics and existing knowledge of PEP and PrEP. Most respondents were females (95.1%), working in sexual health clinics (65.5%), and identified their work as primarily clinical (79.9%). Most respondents were from central Ontario (29.5%), with all geographic regions (Northern, Southwestern, Eastern, Central, and Metropolitan Toronto) represented. The majority of respondents identified as being somewhat familiar with PEP (77.0%) and PrEP (69.7%), with most of the remaining respondents reporting being very familiar with PEP (20.0%) and PrEP (26.1%).

Primary analysis

Overall, 72.7% of respondents (95% CI = 65.9%, 79.5%) indicated that they would be supportive of both nurse-provided PEP and PrEP under medical directives. Another 4.2% (95% CI = 1.2%, 7.3%) would be supportive of nurse-led PEP but not nurse-led PrEP, 6.1% (95% CI = 2.4%, 9.7%) would be supportive of nurse-led PrEP but not nurse led PEP, and 17.0% (95% CI = 11.2%, 22.7%) would be supportive of neither.

Table 1. Respondent characteristics.

Characteristics	Respondents
Sex	
Female	156 (95.1)
Male	7 (4.2)
Other	1 (0.6)
Primary nursing environment	
Community health center	21 (12.7)
HIV clinic	13 (7.9)
Sexual health clinic	108 (65.5)
Family health team	5 (3.0)
Other	18 (10.9)
Nursing classification	
Registered practical nurse	4 (2.4)
Registered nurse	143 (87.2)
Nurse practitioner	15 (9.2)
Other	2 (1.2)
Years in practice	16 (16)
	median, IQR
Primary focus of work	
Clinical	127 (79.9)
Administrative	13 (8.2)
Research	5 (3.1)
Teaching	4 (2.5)
Other	10 (6.3)
Scope of practice	
Administer vaccines	126 (84.6)
Collect throat swabs	106 (71.1)
Collect vaginal swabs	75 (50.3)
Collect rectal swabs	81 (54.3)
Blood draws	123 (82.6)
Dispense medication	132 (88.6)
Physical assessments	75 (50.3)
Counsel patients on HIV prevention/risk reduction	134 (89.9)
Conduct HIV testing with pre- and postcounseling	122 (81.9)
HIV point-of-care testing	84 (56.4)
Region	
Eastern Ontario	31 (19.0)
Central Ontario	48 (29.5)
Metropolitan Toronto	32 (19.6)
Southwestern Ontario	31 (19.0)
Northern Ontario	21 (12.9)
Current knowledge of PEP	
Very familiar	33 (20.0)
Somewhat familiar	127 (77.0)
Not familiar at all	5 (3.0)
Current knowledge of PrEP	
Very familiar	43 (26.1)
Somewhat familiar	115 (69.7)
Not familiar at all	7 (4.2)
Patients seen per week who are HIV-negative but high-risk for HIV-acquisition	
0	6 (3.9)
1–10	83 (53.2)
11–20	52 (33.3)

(continued)

Table 1. Continued

Characteristics	Respondents
21 or greater	15 (9.6)
Work at an establishment which routinely provides PEP	
Yes	37 (22.4)
No	128 (77.6)
Work at an establishment which routinely provides PrEP	
Yes	22 (13.3)
No	143 (86.7)
Ever initiated a conversation about PEP with a patient	
Yes	116 (70.3)
No	49 (29.7)
Ever initiated a conversation about PrEP with a patient	
Yes	103 (62.2)
No	62 (37.6)
Currently provide care under a medical directive	
Yes	144 (87.3)
No	21 (12.7)

PEP: postexposure prophylaxis; PrEP: pre-exposure prophylaxis; IQR: interquartile range. * = Years in practice

Factors associated with support of nurse-led PEP and PrEP are summarized in Table 2. On univariable analysis, the only variable significantly associated with the outcome was duration of nursing experience (measured in decades), where increased experience was negatively associated with support for nurse-led PEP and PrEP (odds ratio (OR) = 0.70 per decade, 95% CI = 0.50, 0.98). The same relationship was observed on multivariable analysis (OR = 0.58, 95% CI = 0.40, 0.86), whereas neither work in a sexual health clinic (OR = 1.95, 95% CI = 0.86, 4.43) nor having been asked about PrEP by a client (OR = 2.14, 95% CI = 0.84, 5.40) was associated with a statistically significant increased likelihood of support.

Secondary analyses

Regarding nurses' existing capabilities for providing PEP and PrEP, we found that a large proportion of nurses perform tasks relevant to the provision of PEP and PrEP as part of their routine clinical practices (Table 1). These include HIV risk reduction counseling (89.9%), HIV testing with pre- and postcounseling (81.9%), and working under a medical directive (87.3%). Self-reported knowledge of key topics related to PEP and PrEP was high (Figure 1), with a majority of respondents agreeing with statements indicating specialized knowledge of HIV (66.7%), sexually transmitted infections (STIs, 89.1%), HIV risk factors (92.6%), and HIV seroconversion symptoms (59.8%). Additionally, a majority of respondents agreed with statements indicating comfort with clinical tasks related to provision of PEP and PrEP, including taking a detailed sexual history (92.7%), medication adherence history (80.4%), and

Table 2. Univariable and multivariable analysis of factors associated with support for nurse-led PEP and PrEP.

Variable	Univariable analysis		Multivariable analysis	
	OR (95% CI)	p	OR (95% CI)	p
Region				
Toronto	1.00	–	1.00	–
Other regions of Ontario	1.49 (0.65–3.41)	0.34	2.27 (0.73–7.00)	0.15
Nursing environment				
Sexual health clinic	1.00	–	1.00	–
Other nursing environment	0.63 (0.31–1.28)	0.21	0.72 (0.28–1.87)	0.50
Years nursing (per decade)				
Very familiar with PEP	0.70 (0.50–0.98)	0.04	0.55 (0.37–0.82)	0.004
Very familiar with PrEP	1.50 (0.60–3.75)	0.38		
Have been asked about PEP	1.58 (0.69–3.63)	0.28		
Have been asked about PrEP	1.47 (0.68–3.19)	0.33		
Have counseled patient on PEP	1.38 (0.62–3.06)	0.42	2.52 (0.96–6.60)	0.06
Have counseled patient on PrEP	1.32 (0.63–2.75)	0.46		
Have counseled patient on PrEP	1.70 (0.84–3.46)	0.14		

PEP: postexposure prophylaxis; PrEP: pre-exposure prophylaxis; OR: odds ratio; CI: confidence interval.

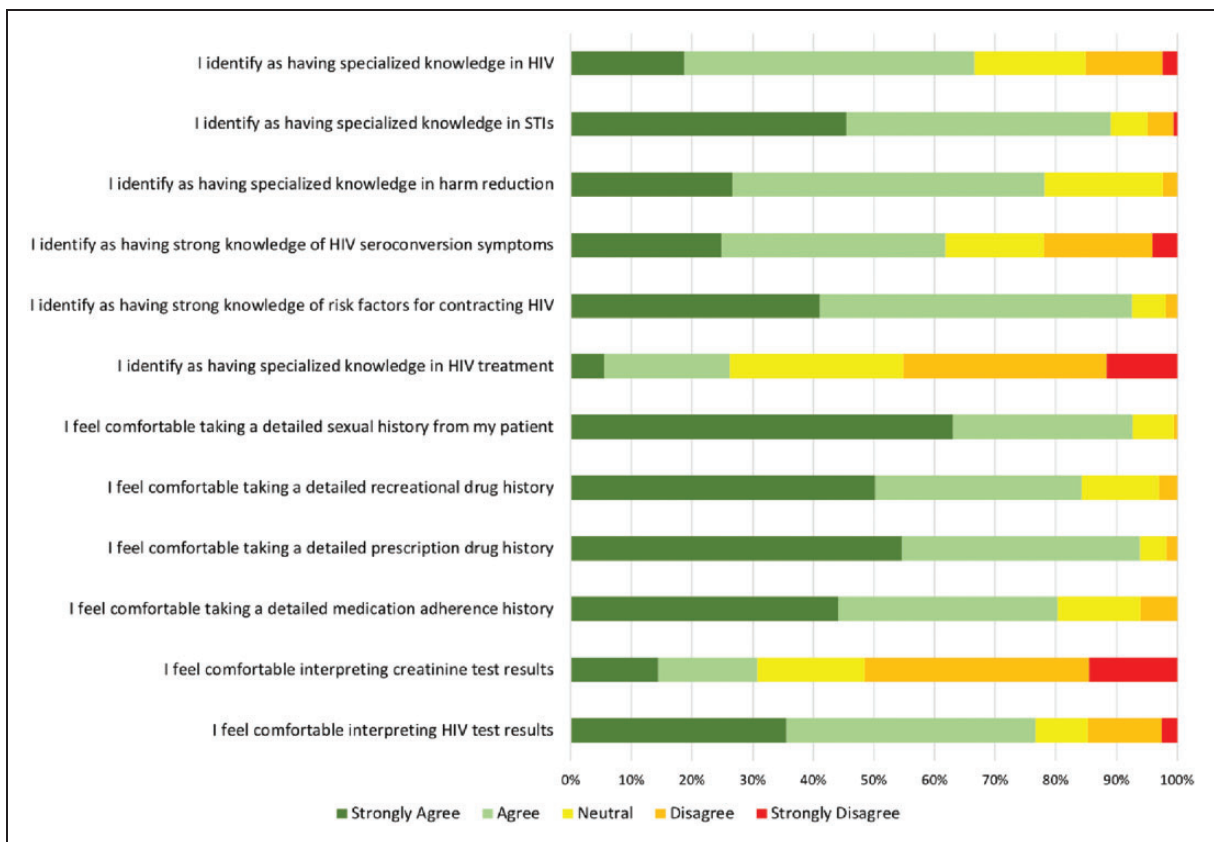


Figure 1. Nurses' self-reported capabilities. STI: sexually transmitted infection.

HIV test interpretation (76.6%). Of note, a majority of respondents indicated a lack of comfort interpreting serum creatinine results (51.6%), suggesting an important learning need. The most preferred formats for learning

more about PEP/PrEP were online learning modules (86.5%), followed by in-person events hosted by an authority such as the Registered Nurses Association of Ontario (71.2%), shadowing opportunities (69.3%)

and websites (68.7%); journal articles (57.7%) were less popular.

To understand nurses' existing opportunities for providing PEP/PrEP, respondents were asked about their prior involvement in the care of patients using PEP/PrEP, experience discussing PEP/PrEP with patients, and interactions with patients who are HIV-uninfected but at high risk of HIV acquisition (Table 1). Although few worked at establishments that routinely provide PEP/PrEP, most respondents had previously seen patients using PEP (56.7%) or PrEP (60.1%), and most had initiated conversations about these interventions as well (70.3%, 62.2% respectively). Virtually, all respondents indicated seeing at least some HIV-uninfected patients at high risk each week, with 53.2% reporting 1 to 10 and another 33.3% reporting 11 to 20 such patients per week.

In further examining relevant opportunities, we explored respondents' current barriers to educating patients about PEP/PrEP as well as their perceived barriers for development of a nurse-led PEP/PrEP strategy in their workplace. The most commonly cited barriers for educating patients about PEP/PrEP included a perceived lack of physician support (38.8% for PEP, 42.9% for PrEP) followed by a lack of knowledge among nurses (38.8% for PEP, 37.4% for PrEP). Other barriers included a perceived lack of support among administrators or managers, and the potential added workload for nurses.

In terms of nurses' motivations for providing PEP and PrEP, most respondents indicated that they would provide education positively supporting the use of PEP/PrEP to a patient at high risk of HIV infection (85.8% and 81.7%, respectively). Most respondents agreed or strongly agreed that investing in PEP/PrEP would be an appropriate use of health-care resources (73.6% and 75.0%, respectively). Qualitative analysis of nurses' reasons for supporting use of PEP and PrEP revealed key themes of increasing access for patients (particularly where access to physicians might be limited) and the importance of interventions to decrease risk of HIV transmission.

Discussion

Our study found a high degree of support among Ontario nurses for the implementation of nurse-led PEP and PrEP. The only participant characteristic which was associated with support for PrEP/PEP was years of nursing experience; that this variable was negatively correlated with support for nurse-led PEP/PrEP suggests that younger nurses were more open to this idea, although we did not directly ask about participants' age. We further used the COM-B behavioral change framework to characterize readiness as well as self-identified barriers and facilitators to nurse-led PEP

and PrEP (Michie et al., 2011) and found that respondents generally already possessed relevant capabilities, opportunities, and motivations to successfully deploy these interventions.

More specifically, in the domain of capabilities for providing PEP and PrEP, we found that most respondents already provide care under medical directives, and the majority of respondents indicate knowledge of or comfort with key components of PEP and PrEP care. Recent guidelines (European AIDS Clinical Society, 2017; Günthard et al., 2016; D. H. S. Tan et al., 2017; U.S. Preventive Services Task Force, 2019; World Health Organization, 2015; Wright et al., 2018) recommend that delivery of PrEP include serologic testing for HIV and viral hepatitis, bacterial STI screening, monitoring of renal function, and assessment of use of other behavioral prevention strategies. A majority of respondents in our survey are routinely performing many of these tasks already, with the exception of interpreting serum creatinine results. Studies of TDF/FTC-based PrEP in HIV-uninfected individuals have demonstrated a small decline in glomerular filtration rate (Trang et al., 2016), and TDF has infrequently been associated with proteinuria, acute kidney injury, or proximal tubular dysfunction (Jotwani et al., 2017) in people living with HIV. Encouragingly, however, a recent meta-analysis has demonstrated no increased risk of renal adverse effects in individuals taking TDF as PrEP (Pilkington et al., 2018), and changes that do occur are generally reversible upon drug discontinuation (Mugwanya et al., 2016). Nevertheless, since monitoring of renal function is considered a key component of the provision of PEP/PrEP in current guidelines (European AIDS Clinical Society, 2017; Günthard et al., 2016; D. H. S. Tan et al., 2017; U.S. Preventive Services Task Force, 2019; World Health Organization, 2015; Wright et al., 2018), providing education on this topic should be a focus of future training for nurses who will deliver these interventions.

With respect to nurses' opportunities for providing PEP and PrEP, facilitators include the fact that a majority of respondents have already been involved in the care of patients using PEP or PrEP and have discussed PEP or PrEP with patients, whether the conversation was patient- or provider-initiated. Despite considerable contact with patients who have used or may benefit from using PEP/PrEP, few nurses reported working in organizations which were currently providing PEP/PrEP. This discrepancy appears to represent an unmet need and also an opportunity for these nurses to deliver PEP/PrEP to eligible patients.

The most commonly cited barrier to the implementation of nurse-led PEP/PrEP was a perceived lack of physician support. Yet many respondents are working in environments where they already provide other, related

interventions under medical directives (e.g., vaccines, antibiotics for bacterial STIs) with physician authorization; as such it is plausible that physicians would be open to extending this model to PEP/PrEP delivery. To the extent that physician support may already exist, but simply not be perceived as such, it is important that teams engage in open communication to foster a collaborative, mutually supportive environment. It is also plausible that some physicians may not be comfortable overseeing nurse-led PEP/PrEP programs, perhaps because they themselves may have limited clinical experience delivering these interventions. Future work should examine the attitudes of supervising public health physicians toward nurse-led PEP/PrEP. Another major barrier was a perceived lack of relevant knowledge among nurses. However, PEP and PrEP are easily protocolized interventions which would be suitable for delivery by nurses with targeted training. Indeed, most nurses in our survey already have the foundational knowledge needed to be providers of PEP and PrEP, as evidenced by the tasks which they perform in their routine work. Online modules were the most preferred platform for further learning about PrEP/PEP delivery, which should inform educational programming for nurses who will act as providers. Although not identified by study respondents, an additional barrier to all HIV PEP prescribing is that the time-sensitive nature of the intervention ideally requires 24-h availability. An emerging solution to this issue is to provide prescriptions for on-demand PEP, or “PEP In Pocket,” to patients meeting criteria for low-frequency but high risk exposures, as has been described elsewhere (Alghamdi et al., 2019, 2020).

In terms of motivations for the provision of PEP and PrEP, we found that most respondents were already willing to educate patients positively about the use of these interventions and felt that they were an effective use of resources that would alleviate access barriers for eligible patients. These results, coupled with the overall high level of support for nurse-led PEP and PrEP, suggest that our respondents have a high degree of intrinsic motivation to deliver these interventions.

There is growing clinical experience with nurse-led PrEP and PEP. A nurse-led PrEP program in San Francisco reported no new HIV infections in nearly 1200 patients (Gibson et al., 2016), and a nurse-led PEP program in Ottawa reported no seroconversions at four months of follow up in 72 patients (O’Byrne et al., 2017). Many other organizations likely already include components of nurse-led care into their existing PEP/PrEP programs. Greater nurse involvement in PEP/PrEP has also been encouraged through calls to increase the role of NPs (Nelson et al., 2019) and public health units (Orser & O’Byrne, 2019) in PrEP scale-up more generally. Taken together, these data suggest a valuable opportunity to use nurses’ existing

competencies to help achieve the tremendous public health potential of these HIV prevention interventions.

Provincial (D. Tan et al., 2019) estimates suggest that based on PrEP initiation criteria, upward of 30,000 gay, bisexual, and other men who have sex with men in Ontario may benefit from this strategy. This is a large population which cannot be adequately served by a limited number of specialists and would benefit from a decentralized, community-based approach to PEP and PrEP delivery. PEP and PrEP are well suited to task shifting, where elements of patient care are moved into the domain of less specialized health-care providers (World Health Organization, 2008). There is extensive experience with task shifting in the realm of HIV treatment, particularly in resource-limited settings (Callaghan et al., 2010; Fairall et al., 2012). PrEP and PEP, with their protocolized delivery, are arguably even better suited to task shifting than HIV treatment.

This study has limitations that warrant consideration. First, responses may be impacted by recall bias or social desirability bias, the latter of which may have overestimated support for PEP and PrEP in this sample. However, the anonymous nature of our survey and self-completion on an electronic platform likely decreased such effects. Second, our survey did not exhaustively cover all topics related to PEP and PrEP provision and monitoring, such as ordering or interpretation of other laboratory investigations, identifying drug interactions, or when to consult a specialist provider. However, PEP and PrEP delivery can be highly protocolized, and these key skills can be taught to those nurses who will act under medical directives. Third, since our survey only targeted Ontario nurses working in specific contexts related to sexual health (public health units, sexual health clinics, community health centers, and HIV clinics), these responses cannot be extrapolated to nurses working in other regions or in other clinical settings. However, the nurses we reached are a logical choice for potential involvement in the future provision of PEP and PrEP under medical directives and thus represent the most relevant sample for inclusion. Fourth, while we were primarily interested in RN-led models of care, we did not restrict enrollment to this class of nurse. However, RNs comprised the vast majority of our respondents, and we feel that the opinions of other classes of nurses may still be relevant to our research question. Finally, we administered this survey to front-line nurses, and not their clinical or institutional managers, who may have raised additional concerns related to program funding and administration. Future work should investigate these important perspectives.

Conclusion

Ongoing efforts to control the HIV epidemic require the widespread scale-up of effective prevention strategies,

including PEP and PrEP. Nurses working in HIV clinics, sexual health clinics, and public health units are uniquely positioned to deliver these interventions under medical directives. Education and implementation efforts are urgently needed to engage these nurses in PEP and PrEP delivery.

Ethical Approval

The study protocol was approved by the Research Ethics Board at St. Michael's Hospital, Toronto Public Health and Region of Peel Public Health. The survey was preceded by a detailed letter of information, and consent was considered implied if participants proceeded to complete the one-time online survey. Participants were informed of their right to withdraw at any point during the survey.

Declaration of Conflicting Interest

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