

Understanding HIV self-testing in the context of COVID-19: an analysis of integrating mobile health solutions with HIV self-testing across Canada

Lucas Penny – Advisor: Sean Rourke
University of Toronto

Introduction

There is a major global push to introduce more effective HIV awareness and treatment, especially among vulnerable populations. In particular, one of the central goals of the UNAIDS 90-90-90 campaign is for 90% of people with HIV worldwide to know their HIV status by 2020 (Canadian Foundation For AIDS Research, 2018). In order for Canada and other countries to meet these HIV testing goals, HIV self-testing services should be actively pursued by public health systems.

As in-person visits and point-of-care testing for HIV are very limited at this time (and in some cases nonexistent) due to COVID-19, it is important to identify the degree to which this is happening across priority populations at risk for HIV; these groups include gay, bisexual, and other Men who have sex with men (gbMSM), Indigenous / First Nations populations, people who inject drugs (PWID), and African, Caribbean and Black (ACB) individuals (Logie et al., 2016).

It is important to understand whether there will be ongoing barriers Canadians will experience for HIV testing, and if there are potential facilitators or novel tools (e.g., mobile technologies) which could mitigate these barriers and access. With more affordable and accessible HIV self-testing options soon to be approved and available in Canada, there are also concerns surrounding proper linkage to care and treatment following testing (Stehler & Siegler, 2019)

The introduction of mobile health (mHealth) is becoming of greater importance as new at-home and self-testing services become accessible to users worldwide. mHealth is a rapidly expanding field focused on providing support, delivery and intervention via mobile technologies, mainly through personal electronics (Park, 2016). The use of peers, defined as someone with a similar background or lived experiences to those at-risk for HIV, have also been considered very important in the effort towards HIV prevention and linkage into care.

To address the barriers to testing, priority populations (gbMSM, Indigenous / First Nations populations, PWID, and ACB) may benefit from access to these types of services given that they are at higher risk for contracting HIV (Haddad et al., 2018). However, more information is needed to ensure that we are building and customizing mHealth technologies that benefit both the end-user and the agencies that support their clients with access to and support with HIV testing.

In order to understand these new technologies and challenges, a Canada-wide survey was developed in order to better inform decisions around the barriers to HIV testing and how mHealth-based technologies may provide benefit in Canada for those at risk for HIV. In addition, we also looked at how COVID-19 is impacting front-line agencies and community-based organizations in regard to harm reduction, community outreach, HIV prevention and

treatment services. Results obtained from all the surveys were synthesized to help update and recommend changes to the HIV self-testing landscape.

There were two objectives that this project looked to answer: (1) What is the degree and extent that COVID-19 is affecting access to HIV testing and linkage to care? And (2) What are the mhealth and community-based systems and supports that might help to address these potential gaps to testing and linkages to care?

Methodology

Participant Recruitment

Any person who was involved in frontline work for HIV support, treatment and care in Canada was encouraged to complete the survey. Study participants were recruited through local and regional community-based organizations across Canada who were involved in HIV testing. This also included organizations who attended a previously planned webinar related to HIV self-testing in Canada. These organizations received an email and a link to the survey which they were then able to distribute among their network.

Patient Survey Development

A literature review was conducted on HIV self-testing strategies and goals included in the Canadian Foundation for AIDS Research (CANFAR) and the World Health Organization's (WHO) policy on HIV self-testing, among others (World Health Organization (WHO), 2016) (Canadian Foundation For AIDS Research, 2018). Interviews with stakeholders from a community-based, gbMSM-focused, HIV prevention organization across Canada were also conducted to develop an understanding of motivational and behavioral factors needed to achieve regular HIV testing and linkage to care. All this information was used to shape the questions for the survey questionnaire.

The survey largely consisted of questions regarding user thoughts about current barriers to access for HIV testing and mHealth HIV self-testing using a mobile application. These questions include, but are not limited to: what are the current barriers that users face for HIV testing; would mobile applications make the testing process easier and more frequent for the user; will self-testing be a financially viable option for target populations; could mobile application increase their willingness to seek further HIV treatment and care; how has COVID-19 affected the HIV testing-landscape?

The survey was built and administered electronically using Qualtrics, which is a web-based application designed to support real-time data capture for research studies. Qualtrics uses two methods to back up and securely store data: through complete off-site encrypted backups and propagation across servers. Links to the survey were provided to potential participants who can then enter their responses directly into the system using their computers, tablets, or smart phones.

Results

Demographics

There were 349 responses completed for the survey from August 6 through September 1, 2020. Most of the participants worked in Ontario (31.6%; 81/254), Manitoba (18.0%; 46/254), Alberta (17.2%; 44/254), and British Columbia (13.7%; 36/254), however responses were gathered from all 10 provinces (Table 1). A significant proportion of participants were a part of a front-line or community-based agency, while other respondents worked in community health centers, public health units, or sexual clinics. Overall, 88.7% (250/282) of respondents felt they were at least moderately informed (56.38%; 159/282) or well-informed (32.27%; 91/282) on the topic of HIV self-testing. At these workplaces, participants mainly worked as frontline or outreach support workers, in educational health promotion, as nurses, or as coordinators. Seventeen percent (n = 44) of the participants had a previous HIV diagnosis (Table 1).

Generally, a vast majority of participants believed that HIV self-testing will be an important tool to end HIV epidemic in Canada (96.8%; 272/281). Also, participants believed that HIV self-testing will have a significant impact on reaching those living with HIV who are not aware they are infected (93.6%; 265/283).

Client Access To HIV Self-Testing

The majority of respondents thought that mobile application or websites were best for ordering and picking up HIV self-tests (figure 1 & 2), which was followed by front-line and community-based agencies. Overwhelmingly, respondents thought that their clients would prefer HIV self-tests being delivered to their home (figure 3).

Respondents believe that approximately 60% of their clients would want to receive an HIV self-test. A large majority of participants thought that your clients would be willing to pass along an HIV self-test to a friend, family member, or sexual partner for them to use if they were available for free (95.9%; 278/290).

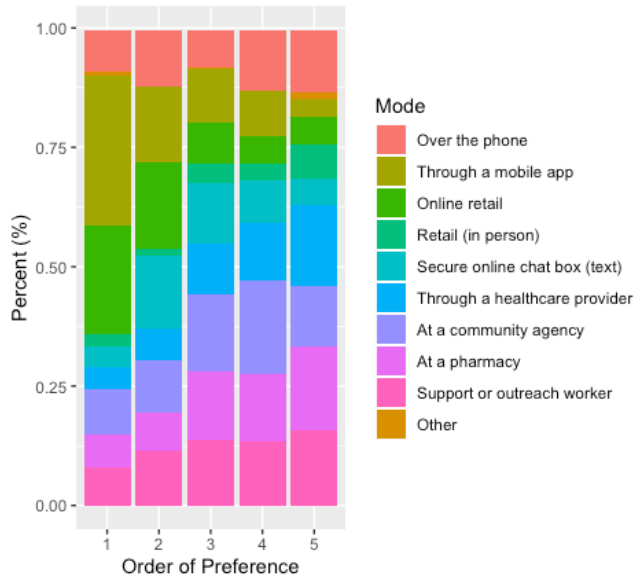


Fig 1 Rank of where clients would be most comfortable ordering HIV self-tests

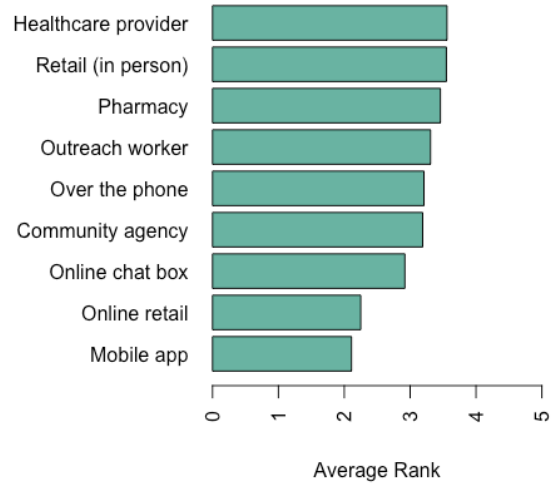


Fig 1a: Average rank of where clients would be most comfortable ordering HIV self-tests

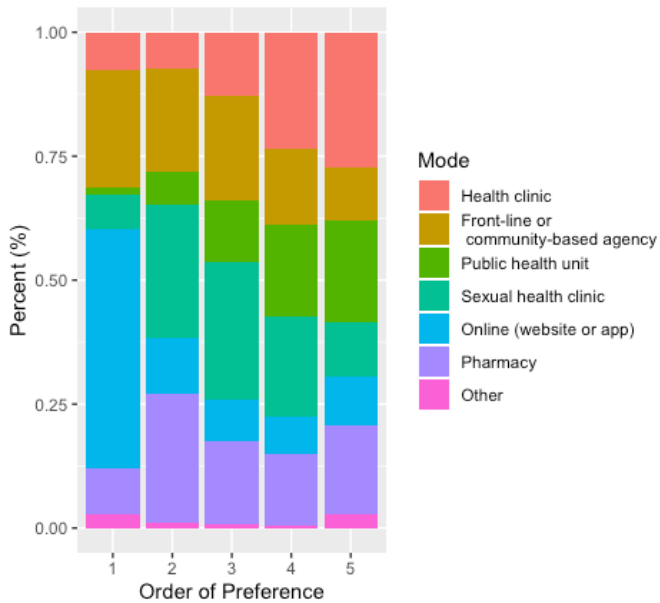


Fig 2: Rank of where clients would be most comfortable picking up an HIVST

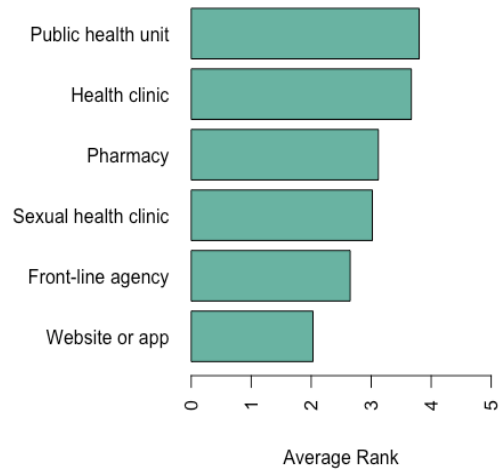


Fig 2a: Average rank of where clients would be most comfortable picking up an HIVST

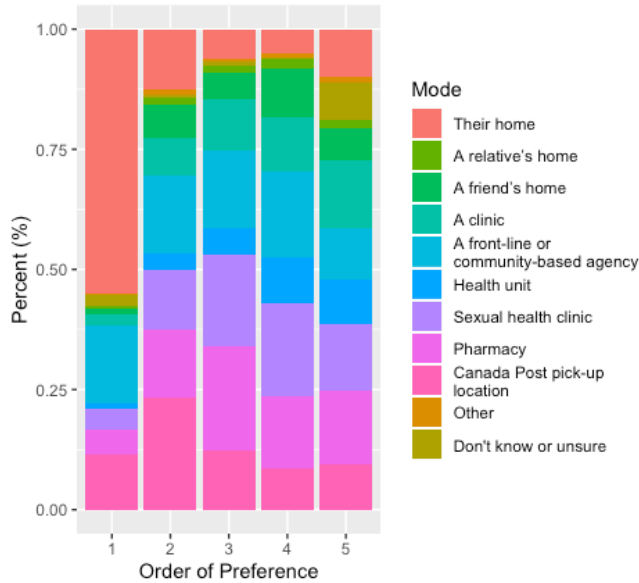


Fig 3: Rank of where clients would be most comfortable getting an HIV self-test delivered

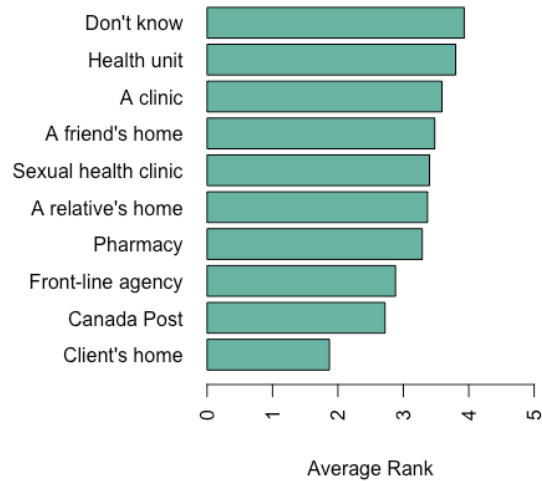


Fig 3a: Average rank of where clients would be most comfortable getting an HIV self-test delivered

HIV Self-Testing Locations and Supports

90.5% (256/282) of respondents felt ready or at least somewhat ready to support HIV self-testing at their agency, and were interested in offering HIV self-testing services at their agency or organization (75.3%; 213/283).

A majority of participants (61.5%; 176/286) indicated that their clients would like someone present to support them during their first HIV self-testing experience, however 33.9% (97/286) of respondents were unsure. Furthermore, almost 75% of respondents (199/268) thought that having a peer present during their clients' HIV self-test would have a positive effect on their clients' overall HIV testing experience.

A large proportion of participants thought that their clients would comfortable be in accessing HIV self-testing support and counselling (74.7%; 198/267) through a secure virtual platform, but less comfortable using the same type of services for pre- or post-test counselling and support (58.5%; 155/266).

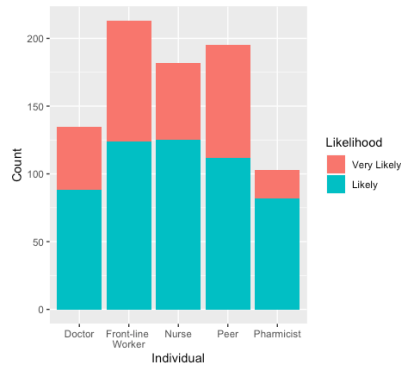


Fig 8: Likelihood of clients connecting with the following individuals over the phone for linkage to care

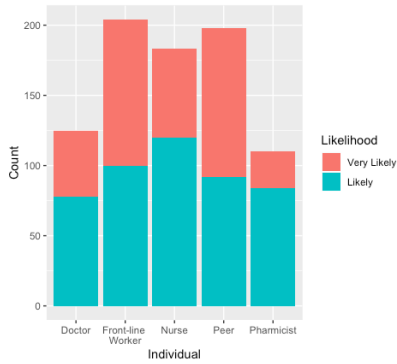


Fig 9: Likelihood of clients connecting with the following individuals through secure text messaging for linkage to care

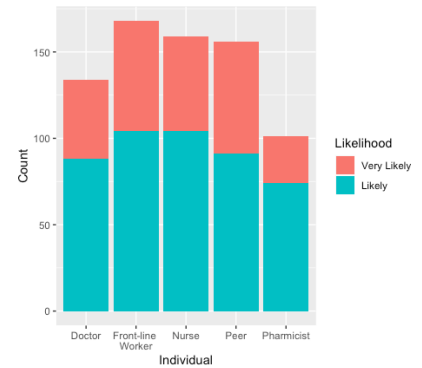


Fig 10: Likelihood of clients connecting with the following individuals through a telehealth platform (a secure online virtual meeting) for linkage to care

Linkage To Care And Services

An overwhelming majority of respondents believed that people being offered HIV self-testing kits should also be offered services for linkages to counselling and care at the same time (98.1%; 257/262). Participants also thought that people being offered harm reduction services should also be offered the opportunity to receive HIV self-testing at the same time (95.0%; 247/260). Finally, participants thought that people being offered HIV self-testing should also be offered opportunities for access to prevention services like PrEP and PEP if they test negative (94.6%; 246/270).

Agency and Health System Access to HIV Testing

When asked about barriers to HIV self-testing within the organization, some groups felt that there was a lack of testing policies in place to know if staff can conduct and support HIV self-testing (23.4%; 113/484). Some respondents also said that none of their funders include HIV self-testing as a deliverable in their current funding agreements (22.1%; 107/484). Other responses included not having adequate human resources (12.2%; 59/484) and not having enough qualified testing staff (11.0%; 53/484) to support HIV self-testing at their organizations.

Further questions were asked related to HIV testing and self-testing policies. 44.6% (115/258) of participants said that peer HIV point-of-care (POC) testing was not permitted at their agency or workplace. However, 69.6% (80/115) of the respondents that didn't have peer HIV POC testing

policies thought that peer HIV point-of-care (POC) testing should be permitted at their agency or workplace. Of the respondents who were aware of HIV testing policies in their community (111/255), 64.9% (72/111) said that there were restrictions or policies in place that limit HIV testing, including peer testing models.

In order to guide these changes, we asked about the impact a national policy might have. A large majority of survey takers (85.7%; 215/254) thought that a national policy surrounding universal access to HIV self-testing would improve and facilitate access for HIV self-testing.

Cost of HIV Self-Testing

A majority of respondents (84.5%; 218/258) thought the maximum cost for an HIV self-test should be \$19.99 (CAD) or less, however many participants also thought the maximum cost should be \$5.00 (CAD) or less (34.8%; 90/258), or between \$5.00 (CAD) and \$10.00 (CAD) (19.1%; 48/258). Interestingly, 20.2% (52/258) thought that HIV self-testing kits should be free.

Furthermore, questions regarding the “Pay It Forward” model were asked. 69.2% (175/254) of respondents said their clients would be willing/financially able to contribute money to support someone else to get tested. 54.7% (140/256) of respondents said their clients would be willing to contribute up to \$10 (CAD), highlighting that this may be a feasible model to use in the future for HIV self-testing programs.

Questions about who should pay for HIV self-testing in Canada once they become approved. An overwhelming majority of participants believe that either the Federal or Provincial Government should pay for the test, followed by insurance companies and community-based organizations. Respondents also thought that the user should be one of the last people to cover the cost of an HIV self-test (Figure 7).

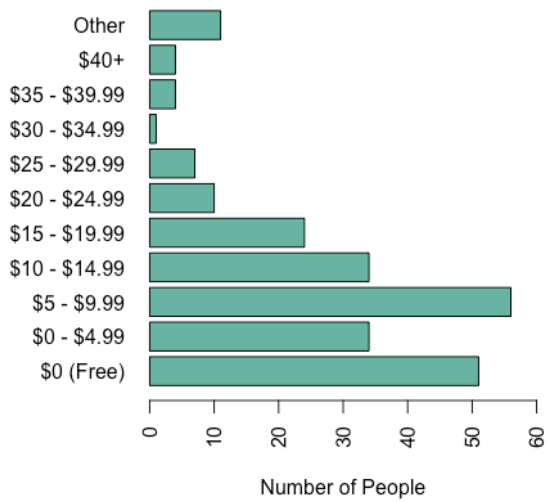


Fig 4: Minimum amount clients would be willing to pay for an HIV self-test (CAD).

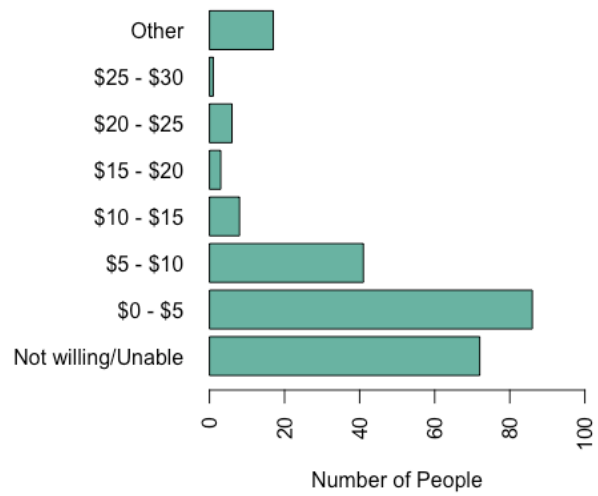


Fig 5: Pay It Forward Model - Willingness of a client to contribute money (from their own pocket) to support someone else to get tested. Most respondents mentioned that clients would not have the financial means to support this model.

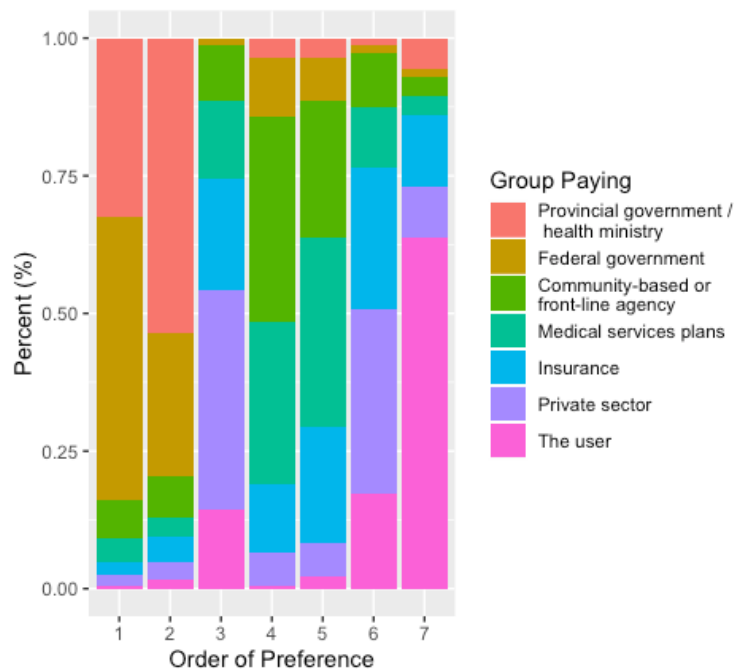


Fig 7: Responses for who participants thought should cover the cost of HIV self-testing kits in Canada.

IMPACT OF COVID-19 ON HIV TESTING AND SERVICES

Since March, COVID-19 has greatly impacted many HIV-related testing and services for priority groups across Canada. Participants noted the largest reduction in HIV testing (-46.5%, n = 161), HCV testing (-44.0%, n = 132), and STBBI testing (-39.8%, n = 135). Respondents also stated that PrEP and PEP services were reduced by 26.4% (n = 93) and 25.8% (n = 79), respectively, however antiretroviral therapy was found to be relatively less impacted (-5.9%, n = 58). Harm reduction services were also impacted, with participants finding that mental health services were the most reduced (-17.4%, n = 155), while needle distribution and disposal services (-13.2%, n = 125) and housing services (-12.9%, n = 74) were impacted less.

Table 1: Characteristics of participants

	All participants (n = 359)	
	N	(%)
Workplace of Agency		
Front-line or community-based agency	129	(49.8)
Community health center	30	(11.6)
Public health unit	26	(10.0)
Hospital	6	(2.32)
Medical office or clinic (combine)	62	(23.9)
Other (try to assign to others)	6	(2.32)
Province (n = 254)		
British Columbia	35	(13.7)
Alberta	44	(17.2)
Saskatchewan	6	(2.4)
Manitoba	46	(18.0)
Ontario	81	(31.6)
Quebec	13	(5.1)
Maritimes	31	(12.2)
Self-reported HIV status (n = 249)		
Positive	44	(17.3)
Negative or unknown	205	(80.7)
Position at Workplace/Agency (n = 409)		
Frontline or outreach support worker	67	(16.4)
Harm reduction worker	29	(7.1)
Educator / health promotion	67	(16.4)
Peer worker or peer navigator	26	(6.4)
Nurse (community health, outreach) or nurse practitioner	49	(12.0)
Certified HIV tester	13	(3.2)
Executive director or program director	27	(6.6)
Manager or coordinator	47	(11.5)
Volunteer	16	(3.9)
Health care provider	22	(5.4)
Researcher	26	(6.4)
Other	20	(4.9)

Table 2: Impact of COVID-19 on HIV-related services across Canada. If questions were not applicable to the respondent, they were not included in the N.

	All participants (n = 256)	
	(%)	N
Impact of COVID-19 on Services		
<i>HIV-Related Services</i>		
HIV testing	(-46.53)	161
HCV testing	(-43.98)	132
STBBI testing	(-39.79)	135
HIV counselling	(-28.71)	158
PrEP	(-26.39)	93
PEP	(-25.77)	79
ARV (HIV medications)	(-5.93)	58
<i>Harm Reduction Services</i>		
Mental health	(-17.36)	155
Addiction (e.g., opiate agonist treatment)	(-15.51)	91
Harm reduction services	(-14.58)	161
Needle distribution and disposal	(-13.19)	133
Housing services	(-12.89)	74
<i>Other Services</i>		
Transportation	(-30.28)	106
Court liaison	(-27.41)	74
Community outreach	(-26.91)	194
Primary care	(-16.64)	95
Food security / food banks	(7.58)	125
Funding support/emergency funding	(16.21)	92
Importance of HIV Self-Testing during COVID-19		
Very important	(69.5)	178
Important	(24.6)	63
Neutral	(4.3)	11
Not Important	(0)	0
Unsure	(1.6)	4

Table 3: Thoughts and perceptions of HIV self-testing and potential impact.

	All Participants (n = 315)	
	N	(%)
Willing to pass along HIV self-test to a friend or sexual partner (n = 279)		
Yes, for sure	126	(45.2)
Yes, perhaps	141	(50.1)
No	10	(3.6)
Impact HIV self-testing can have on reaching undiagnosed (N = 278)		
Will significantly increase diagnosis rate	85	(30.5)
Will moderately increase diagnosis rate	176	(63.1)
No change expected/ decrease diagnosis	17	(6.4)
How would you rank your knowledge of HIV self-testing? (n= 278)		
Well-informed on the subject	90	(32.4)
Moderately informed on the subject	157	(56.5)
I am not informed on the subject	31	(11.2)
HIVST will be an important tool to end the HIV epidemic in Canada (n = 277)		
Yes, definitely	167	(60.3)
Yes, somewhat	101	(36.5)
No change expected	9	(3.3)
Do your clients want someone present during their first HIV self-test? (n= 279)		
Yes	171	(61.3)
No	12	(4.3)
Not sure	96	(34.1)
Should peer HIV point-of-care (POC) testing should be permitted in your agency or workplace? (n = 115)		
Yes	80	(69.6)
No	12	(10.4)
Not sure	23	(20.0)
How would a national policy regarding universal access to HIV self-testing impact HIV self-testing in Canada? (n= 254)		
It will improve and facilitate access	215	(84.6)
It will decrease and hinder access	8	(3.2)
Do not expect to have any effect	7	(2.8)
Don't know or unsure	24	9.5)

Conclusion

Many Canadian gbMSM are experiencing COVID-19 related impacts on their general wellbeing and resources, which is not unexpected given the widespread economic and social effects of the COVID-19 pandemic. Our participants noted major impacts to services, such as testing, transportation and harm reduction services. Being that there are COVID-19 related barriers to HIV and STI testing, PrEP access, and HIV treatment, many participants reported HIV self-testing as a viable option to alleviate stress for HIV-related agencies and organizations across Canada. A COVID-19 mitigation strategy and program that incorporated HIV linkage to care and HIV self-testing could have the potential to keep patients safe while also increasing access to vulnerable populations. A transition to mobile health and telehealth platforms are one way that front-line workers and health care professionals believe could positively impact the future of HIV testing.

Many respondents believed that mobile health-based technology combined with HIV self-testing would positively impact at-risk populations' access to HIV linkage and care. It was also noted that vulnerable populations would prefer the privacy of their home when HIV testing, which could mean an uptake in HIV testing when self-testing kits are approved in Canada. Many agencies thought they were prepared to incorporate HIV self-testing into their programming and felt that it would have a positive impact on HIV testing across Canada. In light of COVID-19, many respondents felt that using virtual platforms to connect individuals to health care providers or peers for HIV linkage and care would be helpful but that it may require a transition period. Finally, the cost of HIV self-testing will determine whether HIV testing becomes more accessible throughout the country. Many respondents felt that HIV self-testing should be paid for by a government agency or by insurance companies being that the maximum cost they thought their clients would be willing to pay was less than \$19.99 (CAD).

Several limitations of this study should be considered. The data collected comes from front-line agencies and not directly from populations who are generally more at-risk for HIV or people who use HIV testing services. This means that this data is not generalizable to gbMSM in Canada, but does provide insight from organizations and agencies that work closely with these groups. Also, this survey only involved self-reporting of COVID-19 related impacts and attitudes towards HIV self-testing. This means it is unclear whether some of the data was misreported and to what extent that biased out findings. In order to adequately understand some of these questions, a more detailed quantitative and qualitative study would need to be conducted in order to fully understand the scope HIV self-testing in Canada. It is also important to note that this data was gathered during COVID-19 which is dynamic in how it effects communities throughout the country, regardless of the industry. While this may have some impact on the reproducibility of the study, it always the opportunity to rapidly examine what is happening to various frontline agencies and to see how they are adapting while COVID-19 progresses.

Some next steps for this project include looking at priority populations who use HIV testing often to understand what their thoughts and perceptions are in comparison to that of Canadian front-line and healthcare organizations. This will give agencies an idea of the gaps that must be met in order to reach Canada's goal for HIV testing. Another avenue that could be of interest is to

conduct the same survey over next summer to see if there are any changes in attitudes towards HIV self-testing. This is especially important because HIV self-testing kits will be approved by 2021, which will give front-line agencies time to work with this new technology and have a better understanding of how vulnerable populations respond to conducting HIV testing by themselves. Both of these objectives will help shape how Canadians conduct HIV self-testing and hopefully inform decisions for policy makers and organization to better handle HIV testing and linkage to care across the country.

References:

- Canadian Foundation For AIDS Research. (2018). *Ending the HIV Epidemic in Canada in Five Years*. <https://canfar.com/wp-content/uploads/2018/08/Ending-HIV-In-Canada-Aug-15.pdf>
- Haddad, N., Li, J. S., Totten, S., & Mcguire, M. (2018). *HIV in Canada — Surveillance Report , 2017*. *44*(1), 324–332.
- Logie, C. H., Jenkinson, J. I. R., Earnshaw, V., Tharao, W., & Loutfy, M. R. (2016). A structural equation model of HIV-related stigma, racial discrimination, housing insecurity and wellbeing among African and Caribbean Black women living with HIV in Ontario, Canada. *PLoS ONE*, *11*(9). <https://doi.org/10.1371/journal.pone.0162826>
- Park, Y. T. (2016). Emerging new era of mobile health technologies. *Healthcare Informatics Research*, *22*(4), 253–254. <https://doi.org/10.4258/hir.2016.22.4.253>
- Steehler, K., & Siegler, A. J. (2019). Bringing HIV self-testing to scale in the United States: A review of challenges, potential solutions, and future opportunities. *Journal of Clinical Microbiology*, *57*(11), 1–12. <https://doi.org/10.1128/JCM.00257-19>
- World Health Organization (WHO). (2016). WHO Recommends HIV Self-Testing. *Policy Brief*, *0*(December), 1–2.