

Are we ready for human papillomavirus testing?

Assessment of patient knowledge of and preferences for cervical cancer screening in Ontario

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Abstract

Objective To determine patient knowledge and preferences about primary human papillomavirus (HPV) testing.

Design Cross-sectional survey.

Setting Two family practice clinics (urban and suburban) and the social media platforms of 2 hospitals in the greater Toronto area between January and February 2023.

Participants A total of 413 Ontario residents aged 25 to 69 years, with a cervix, who qualified for Papanicolaou (Pap) screening and could communicate in English.

Methods Electronic survey containing questions about knowledge of, and preferences for, cervical cancer screening, including types of screening and screening intervals, and about education related to HPV and screening intervals.

Main findings Of 441 potential participants, 426 were eligible and consented to participate in the study; ultimately 413 provided completed or partially completed surveys (96.9% response rate). Of those who completed a recent Pap test, 57.8% (208 of 360) knew of HPV testing. Initially, 27.8% thought HPV testing was better than Pap testing for cervical cancer screening. After learning HPV tests exist and have self-sampling options, most participants preferred HPV testing (self-sampling 46.3%, provider sampling 34.1%). Annual cervical cancer screening was preferred by 50.1% of participants despite knowing that, for most people, Pap tests should be conducted every 3 years (74.8%). After learning about HPV testing, participants were more likely to prefer 5-year screening intervals (43.8%); however, those in the family practice group were still more likely to prefer 3-year intervals compared with those in the social media group ($P < .01$).

Conclusion Participants in this study identified a preference for HPV testing and self-sampling options. Concerns were raised about extended screening intervals and the safety of self-collected samples that need to be addressed in public health education initiatives during rollout of new screening programs.

Sommes-nous prêts pour le dépistage du virus du papillome humain?

Évaluation des connaissances et des préférences des patientes concernant le dépistage du cancer du col en Ontario

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Résumé

Objectif Déterminer les connaissances et les préférences des patientes concernant le dépistage primaire du virus du papillome humain (VPH).

Type d'étude Un sondage transversal.

Contexte Deux cliniques de pratique familiale (en milieu urbain et en banlieue) et les plateformes de médias sociaux de 2 hôpitaux dans la région du Grand Toronto, entre janvier et février 2023.

Participants Au total, 413 résidentes de l'Ontario, âgées de 25 à 69 ans et ayant un col de l'utérus, qui étaient admissibles au dépistage de Papanicolaou (Pap) et pouvaient communiquer en anglais.

Méthodes Un sondage électronique sur des questions concernant les connaissances et les préférences relatives au dépistage du cancer du col, notamment les types de dépistage et les intervalles entre les tests, et sur l'éducation liée au VPH et aux intervalles entre les tests.

Principales constatations Parmi 441 participantes potentielles, 426 étaient admissibles et ont consenti à participer à l'étude; finalement, 413 ont répondu complètement ou partiellement au sondage (taux de réponse de 96,9 %). Chez celles qui avaient subi récemment un test de Pap, 57,8 % (208 sur 360) connaissaient le dépistage du VPH. Initialement, 27,8 % pensaient que le dépistage du VPH était meilleur que le test de Pap pour le dépistage du cancer du col. Après avoir appris l'existence des tests de dépistage du VPH et des options d'autotest, la plupart des participantes préféraient le dépistage du VPH (46,3 % en faveur de l'autodépistage, 34,1 % pour le prélèvement par un clinicien). Le dépistage annuel du cancer du col était privilégié par 50,1 % des participantes, même si elles savaient que pour la plupart des personnes, les tests de Pap devraient être effectués tous les 3 ans (74,8 %). Après en avoir appris davantage sur le dépistage du VPH, il était plus probable que les participantes préfèrent un intervalle de 5 ans (43,8 %); toutefois, chez celles du groupe des cliniques de pratique familiale, il était toujours plus probable qu'elles favorisent des intervalles de 3 ans par rapport à celles du groupe des médias sociaux ($p < ,01$).

Conclusion Les participantes à cette étude ont exprimé une préférence pour le dépistage du VPH et les options d'autotests. Des inquiétudes ont été soulevées à propos des intervalles prolongés entre les dépistages et de la sécurité des spécimens prélevés par les intéressées, auxquelles il faudra répondre dans les initiatives d'éducation en santé publique durant le déploiement des nouveaux programmes de dépistage.

Cervical cancer is the fourth most common cancer in women worldwide.¹ Almost all (99.7%) cases are linked to high-risk human papillomavirus (HPV) infection.² Prince Edward Island is the only Canadian province where HPV testing is used for primary cervical cancer screening; however, 6 other provinces and 1 territory had plans to implement it as of 2022.³ Currently, cervical cancer screening relies on cervical cytology (Papanicolaou [Pap] tests). However, primary HPV testing has been found to better detect precancers and cancers than Pap tests.⁴⁻⁶ A 2018 landmark trial found HPV testing identified more lesions otherwise missed by cytology.⁷ Consequently, Ontario Health (Cancer Care Ontario)⁸ intends to replace Pap tests with HPV tests over 5 years, beginning in 2025. Screening intervals will also change to 5 years, from 3 years, for those at average risk of cervical cancer who receive a negative HPV test result.^{9,10} In addition, the Canadian Task Force on Preventive Health Care recommends screening initiation at age 25 years instead of 21 years.¹¹ Australia and the Netherlands have already successfully implemented primary HPV screening into national programs.^{12,13}

Prior to large-scale screening program changes, effective public education and rollout strategies are crucial. In Australia, implementation faced opposition due to mistrust and concerns about the extended screening interval as a cost-saving measure.^{12,14} Acceptance from providers and patients is essential to maintaining screening rates. Ontario is planning HPV screening with provider-collected vaginal samples, while other regions will allow self-vaginal sampling. Pilot projects are under way to assess urine HPV screening in Halifax, NS.¹⁵

As primary HPV screening is introduced across Canada, understanding public knowledge and preferences is important for the development of effective public education and rollout strategies. The primary objective of this study was to determine current knowledge of, and preferences for, primary HPV testing among Ontario residents, aged 25 to 69 years, with a cervix, to aid in developing public education materials for the transition to HPV testing.

— Methods —

Study design

A cross-sectional study was designed to assess patient knowledge of, and preferences for, primary HPV testing. Research Ethics Board approval was obtained from Mount Sinai Hospital (REB 22-0111-E). Data were collected through an online survey based on a modified version used in an Alberta family practice HPV preference study.¹⁶ The survey collected participant demographic characteristics; Pap screening history; experiences with Pap screening; knowledge of HPV testing; knowledge of accuracy, safety, and benefits of HPV testing compared

with Pap screening; and preference of screening intervals or type of screening (eg, no screening, Pap test, provider-collected HPV, patient-collected HPV, urine-based HPV). The 2 sample populations included in the survey were the general public and family practice patients. Based on a 95% confidence interval and aiming to achieve a margin of error of less than 5%, the calculated required sample size was 384 participants.

Participants were asked whether their Pap screenings were current. If yes, participants were prompted to answer a question about awareness of HPV DNA testing. If no, participants were asked about reasons for having forgone Pap testing. The remaining questions were the same for all participants. After questions about preferences related to testing and screening intervals, participants were provided information about HPV testing and screening interval safety. Two additional questions were then asked to re-evaluate testing and screening preferences after participants had received this information.

Study population

The survey was posted on social media platforms (Twitter, Instagram, and Facebook) used by Sinai Health, a hospital system in Toronto, Ont, composed of 2 hospitals (Mount Sinai Hospital and Hennick Bridgepoint Hospital), and distributed to an academic family health team (a type of interdisciplinary primary health care practice in Ontario) with 2 sites: 1 in downtown Toronto and 1 in a suburban area of Vaughan, Ont. Participants were also recruited from the Mount Sinai Academic Family Health Team through an e-bulletin. Additionally, clinical patients were introduced to the study by doctors or nurse practitioners and provided with the survey link via a QR code located in an examination room or provided with a paper version of the survey to be completed and returned to a research assistant. As of July 2023 Sinai Health had 30,300 Twitter, 8562 Instagram, and 7700 Facebook followers, respectively. Survey data were collected between January and February 2023. Ontario residents aged 25 to 69 years, with a cervix, who qualified for Pap screening were eligible to participate. The survey was available in English only. Participants who could not read, write, or communicate in English were excluded.

Data analysis

Main outcome measures of the study included the percentage of participants who were up to date on cervical screening and aware of HPV testing; current attitudes toward extending screening intervals; and preferences for screening. Analyses were conducted using SAS version 9.4. Descriptive statistics were used to report survey data. Chi-square tests and Fisher exact test, where applicable, were used to assess categorical relationships between study groups. The threshold of statistical significance was $P < .05$.

— Results —

A total of 441 people were initially recruited either in person at the family practice or online through social media. The e-bulletin was sent to 8761 email addresses and had an open rate of 75.6%. Overall, 426 participants were eligible for the study and consented to participate, and 413 participants completed or partially completed the survey, resulting in a response rate of 96.9% (Figure 1). Of 413 participants who completed the survey, 179 were recruited via social media while 234 were recruited in person or via the clinic e-bulletin (Table 1).

Sociodemographic characteristics

The mean (SD) age of social media participants was 41.9 (10.4) years, which was younger than family practice participants with a mean age of 46.6 (12.2) years ($P<.01$). Most participants had postsecondary education or higher (96.9%); lived in a location with more than 1,000,000 inhabitants (70.5%); had been born in Canada (78.0%); and had a family doctor (96.4%). Of those born outside Canada, 33.7% had moved to Canada before 10 years of age.

Experiences and knowledge of Pap testing

A total of 279 study participants (67.6%) knew most cervical cancer is caused by HPV (Table 2). Most participants (97.8%) had had a Pap test completed by a health professional. Female physicians had completed tests for 331 participants (81.9%). A total of 245 participants (60.6%) indicated Pap testing was not at all or minimally

painful, while 100 (24.8%) found the test moderately or extremely painful. A total of 81 participants (20.0%) stated Pap tests were moderately or extremely embarrassing. Most participants (311; 77.0%) found that Pap tests were not at all or minimally time consuming.

Of the 404 participants who had had a previous Pap test, 360 (89.1%) had experienced the test during the previous 3 years. Of the 360 who had experienced a Pap test in the previous 3 years, 208 (57.8%) were aware of HPV testing for cervical cancer screening. More participants from the social media group were aware of HPV testing for cervical cancer screening compared with the family practice group ($P=.02$).

Among those who had not had a Pap test in the previous 3 years ($n=35$), the most frequently stated primary reason for forgoing testing was difficulty finding time for a Pap test (22.9%). Other reasons for forgoing testing included not knowing if or when a Pap test was required (17.1%), testing not suggested by a doctor (14.3%), Pap tests being uncomfortable or embarrassing (11.4%), not being sexually active (12.5%), hard to get an appointment (11.4%), and reminder for testing not provided (11.4%) (Table 2).

Of the 35 participants who had not had a Pap test in the previous 3 years, 13 (37.1%) were aware of HPV testing. While many (88.6%) were initially unaware of self-sampling, after being provided this information most (94.3%) felt self-sampling should be an option (Table 3). In the underscreened group, 24 participants (68.6%) preferred the option of HPV self-sampling.

Knowledge and preferences for HPV testing

At baseline, 291 participants (70.5%) felt HPV testing would not be better than Pap testing or were unsure (Table 4). More participants in the social media group (62 of 179) compared with the family practice group (53 of 234) ($P=.03$) believed HPV testing to be better than Pap testing. Most participants (83.1%) were unaware of self-sampling for cervical cancer screening. Similarly, a higher proportion of participants in the social media group (15.6%) were aware of self-sampling compared with the family practice group (8.5%) ($P=.03$). Most participants (89.1%) moderately or strongly agreed that people with a cervix should be given the option of HPV self-sampling. This sentiment was higher in the underscreened group at 94.3%.

A higher proportion of participants in the social media group compared with the family practice group (82.1% vs 69.2%; $P<.01$) were aware Pap tests should occur every 3 years. Participants in the family practice group were more likely to prefer annual cervical cancer screening (56.8%). The social media group preferred screening every 3 years (44.1%).

After participants received information stating that HPV testing is more accurate than Pap testing and that it can safely be done every 5 years, 80.4% preferred HPV testing, with 46.2% preferring to take their own HPV samples, compared with 34.1% who preferred to have

Figure 1. Participant inclusion and exclusion flowchart

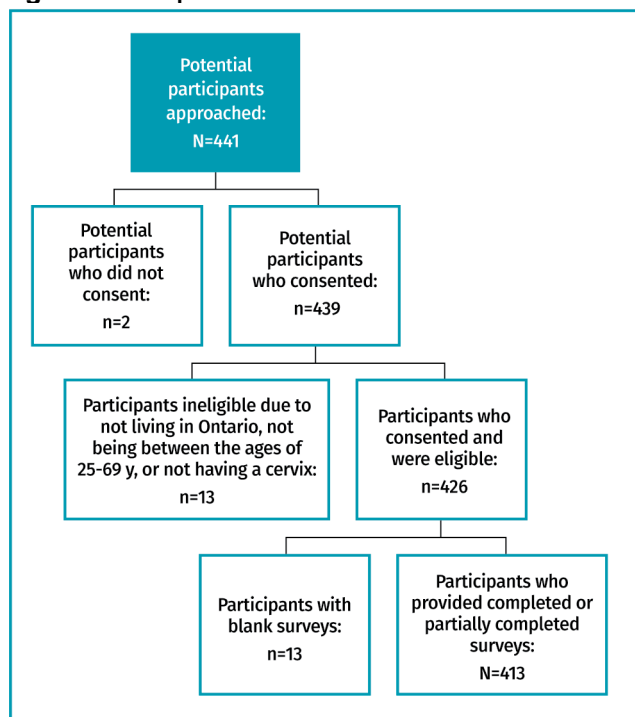


Table 1. Participant characteristics, N=413

CHARACTERISTIC	OVERALL (N=413)	FAMILY PRACTICE PARTICIPANTS (n=234)	SOCIAL MEDIA PARTICIPANTS (n=179)	P VALUE*
Mean (SD) age, y	44.6 (11.7) [†]	46.6 (12.18)	41.9 (10.4)	<.01
Education, n (%)				.49
• High school diploma or equivalent	12 (2.9)	9 (3.9)	3 (1.7)	
• University or college degree	185 (44.8)	102 (52.1)	83 (46.4)	
• Graduate degree	215 (52.1)	122 (43.6)	93 (52.0)	
• Missing data	1 (0.24)	1 (0.43)	0 (0)	
Community size, n (%)				<.01
• Small town, village, or hamlet (<20,000)	9 (2.2)	1 (0.43)	8 (4.5)	
• Large town (20,000-100,000)	25 (6.1)	11 (4.7)	14 (7.8)	
• City (>100,000-300,000)	40 (9.7)	18 (7.7)	22 (12.3)	
• Large city (>300,000-<1,000,000)	47 (11.4)	18 (7.7)	29 (16.2)	
• Metropolis (1,000,000-3,000,000)	164 (39.7)	101 (43.2)	63 (35.2)	
• Megalopolis (>3,000,000)	127 (30.8)	84 (35.9)	43 (24.0)	
• Missing data	1 (0.24)	1 (0.43)	0 (0)	
Birthplace, n (%)				.01
• Canada	322 (78.0)	172 (73.5)	150 (83.8)	
• Outside Canada	91 (22.0)	62 (26.5)	29 (16.2)	
Age when moved to Canada, n (%) [‡]				.36
• 0-10 y	30 (33.7)	20 (32.2)	10 (37.0)	
• 11-20 y	17 (19.1)	11 (17.7)	6 (22.2)	
• 21-30 y	23 (25.8)	17 (27.4)	6 (22.2)	
• 31-40 y	15 (16.9)	11 (17.7)	4 (14.8)	
• 41-50 y	4 (4.5)	3 (4.8)	1 (3.7)	
Has a family doctor, n (%)				<.01
• Yes	398 (96.4)	232 (99.2)	166 (92.7)	
• No	10 (2.4)	1 (0.4)	9 (5.0)	
• Missing data	5 (1.2)	1 (0.4)	4 (2.2)	

*P values reflect χ^2 test comparisons between participant groups or Fisher exact test where applicable.
[†]Age estimates provided for 303 of 413 participants due to missing data.
[‡]Missing data present.

them collected by a provider. Of the 35 participants who had not experienced a Pap test in the previous 3 years, 88.6% preferred HPV testing for future screening, with 68.6% also preferring the option to self-sample. Only 20% preferred to have a provider collect the sample.

After providing participants with information on the accuracy of HPV testing, the safety of 5-year screening intervals, and risks of over testing, 43.8% of participants (181 of 413) overall preferred 5-year screening over other screening intervals. However, there was a statistically significant difference between the 2 groups; social

media participants preferred 5-year testing, while family practice participants preferred 3-year testing ($P<.01$). When informed about HPV testing using urine samples, 57.4% of all participants preferred this option.

— Discussion —

This study aimed to understand the current knowledge of, and preferences for, HPV testing for cervical cancer in Ontario among participants recruited from social media and from urban and suburban family practice settings.

Table 2. Participant experiences with Pap and HPV screening tests

SURVEY QUESTION AND POSSIBLE RESPONSES	OVERALL (N=413), n (%)	FAMILY PRACTICE PARTICIPANTS (n=234), n (%)	SOCIAL MEDIA PARTICIPANTS (n=179), n (%)	P VALUE
What percentage of cervix cancer do you think is caused by HPV?				.63
• 0%-25%	35 (8.5)	21 (8.9)	14 (7.8)	
• 26%-50%	94 (22.8)	53 (22.7)	41 (22.9)	
• 51%-75%	138 (33.4)	84 (35.9)	54 (30.2)	
• 76%-100%	141 (34.1)	73 (31.2)	68 (38.0)	
• Missing data	5 (1.2)	3 (1.3)	2 (1.1)	
Have you ever had a Pap test done by a health professional?				
• Yes	404 (97.8)	229 (97.9)	175 (97.8)	.65
• No	6 (1.5)	4 (1.7)	2 (1.1)	
• Missing data	3 (0.7)	1 (0.4)	2 (1.1)	
What is the gender of the physician that normally completes your Pap test?*				.20
• Male	67 (16.6)	31 (13.5)	36 (20.6)	
• Female	331 (81.9)	194 (84.7)	137 (78.3)	
• Unsure	1 (0.3)	1 (0.4)	0 (0)	
• Other	5 (1.2)	3 (1.3)	2 (0.5)	
• Both genders	4 (80)	3 (60)	1 (20)	
• Male until now	1 (20)	0 (0)	2 (20)	
Thinking about your experience in general of having a Pap test, please rate the following:*				
The procedure was painful				.62
• Not at all	83 (20.5)	42 (18.3)	41 (23.4)	
• Minimally	162 (40.1)	93 (40.6)	69 (39.4)	
• Neutral	58 (14.4)	34 (14.8)	24 (13.7)	
• Moderately	88 (21.8)	50 (21.8)	38 (21.7)	
• Extremely	12 (3.0)	9 (3.9)	3 (1.7)	
• Missing data	1 (0.2)	1 (0.4)	0 (0)	
The procedure was uncomfortable				.82
• Not at all	20 (5.0)	11 (4.8)	9 (5.1)	
• Minimally	145 (35.9)	88 (38.4)	57 (32.6)	
• Neutral	29 (7.2)	17 (7.4)	12 (6.9)	
• Moderately	171 (42.3)	92 (40.2)	79 (45.1)	
• Extremely	34 (8.4)	19 (8.3)	15 (8.6)	
• Missing data	5 (1.2)	2 (0.9)	3 (1.7)	
I was embarrassed				.40
• Not at all	151 (37.4)	92 (40.2)	59 (33.7)	
• Minimally	116 (28.8)	65 (28.4)	51 (29.1)	
• Neutral	53 (13.1)	26 (11.4)	27 (15.4)	
• Moderately	64 (15.8)	33 (14.4)	31 (17.7)	
• Extremely	17 (4.2)	12 (5.2)	5 (2.9)	
• Missing data	3 (0.7)	1 (0.4)	2 (1.2)	
It was time consuming				.11
• Not at all	180 (44.6)	112 (48.9)	68 (38.9)	
• Minimally	131 (32.4)	75 (32.8)	56 (32.0)	
• Neutral	36 (8.9)	18 (7.8)	18 (10.3)	
• Moderately	45 (11.2)	18 (7.8)	27 (15.4)	
• Extremely	7 (1.7)	4 (1.8)	3 (1.7)	
• Missing data	5 (1.2)	2 (0.9)	3 (1.7)	

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SURVEY QUESTION AND POSSIBLE RESPONSES	OVERALL (N=413), n (%)	FAMILY PRACTICE PARTICIPANTS (n=234), n (%)	SOCIAL MEDIA PARTICIPANTS (n=179), n (%)	P VALUE	
Have you had a Pap test in the past 3 years?*					
• Yes	360 (89.1)	204 (89.1)	156 (89.1)	.09	
• No	35 (8.7)	17 (7.4)	18 (10.3)		
• Unsure	9 (2.2)	8 (3.5)	1 (0.6)		
If you answered no, what is your main reason for not having a Pap test in the past 3 years?†				.59	
• A Pap test performed by a doctor is/ would be embarrassing	2 (5.7)	1 (5.9)	1 (5.6)		
• A Pap test performed by a doctor is/would be too uncomfortable/embarrassing	4 (11.4)	2 (11.8)	2 (11.1)		
• I am not sexually active	3 (8.6)	2 (11.8)	1 (5.6)		
• I don't know if or when you should have a Pap test	1 (2.9)	0 (0)	1 (5.6)		
• I have not received a reminder to have a Pap test	4 (11.4)	4 (23.5)	0 (0)		
• It is hard to find the time to have a Pap test	8 (22.9)	3 (17.6)	5 (27.8)		
• It is hard to get an appointment	4 (11.4)	1 (5.9)	3 (16.7)		
• It is hard to travel to an appointment	1 (2.9)	0 (0)	1 (5.6)		
• My doctor has not suggested a Pap test	2 (5.7)	1 (5.9)	1 (5.6)		
• Other	6 (17.1)	3 (17.6)	3 (16.7)		
If you answered no, what are your other reasons for not having a PAP test in the past 3 years?†‡					.89
• A Pap test performed by a doctor is/would be too uncomfortable/embarrassing	4 (11.4)	0 (0)	4 (22.2)		
• I don't/wouldn't feel comfortable asking for a Pap test from my doctor	2 (5.7)	0 (0)	2 (11.1)		
• I have not received a reminder to have a Pap test	3 (8.6)	1 (5.9)	2 (11.1)		
• I am not sexually active	4 (12.5)	2 (11.8)	2 (11.1)		
• My doctor has not suggested a Pap test	5 (14.3)	3 (17.6)	2 (11.1)		
• I have not received a reminder to have a Pap test	4 (11.4)	1 (5.9)	3 (16.7)		
• I don't know if or when I should have a Pap test	6 (17.1)	5 (29.4)	1 (5.6)		
• It is hard to get an appointment	4 (11.4)	2 (11.8)	2 (11.1)		
• It is hard to find the time to have a Pap test	1 (2.9)	0 (0)	1 (5.6)		
• Not applicable	4 (11.4)	2 (11.8)	2 (11.1)		
• Other	8 (22.9)	3 (17.6)	5 (27.8)		
If you answered yes, have you heard of HPV testing as a test for cervical cancer screening?§				.02	
• Yes	208 (57.8)	104 (51.0)	104 (66.7)		
• No	118 (32.8)	77 (37.7)	41 (26.3)		
• Unsure	30 (8.3)	20 (9.8)	10 (6.4)		
• Missing data	4 (1.1)	3 (1.5)	1 (0.6)		

HPV—human papillomavirus, Pap—Papanicolaou.

*For this question N=404.

†For this question N=35, with 17 family practice participants and 18 social media participants.

‡More than 1 response allowed per participant.

§For this question N=360, with 204 family practice participants and 156 social media participants.

Table 3. Participant knowledge regarding HPV testing options for those who have not had a Pap test in the past 3 years

SURVEY QUESTION AND POSSIBLE RESPONSES	OVERALL (N=35), n (%)	FAMILY PRACTICE PARTICIPANTS (n=17), n (%)	SOCIAL MEDIA PARTICIPANTS (n=18), n (%)	P VALUE
Based on your current knowledge, do you think HPV testing would be better than Pap testing?				.04
• Yes	13 (37.1)	3 (17.7)	10 (55.6)	
• No	2 (5.7)	1 (5.9)	1 (5.6)	
• Unsure	20 (57.2)	13 (76.5)	7 (38.9)	
Are you aware of the option of self-sampling for cervical cancer screening?				.16
• Yes	3 (8.6)	0 (0)	3 (16.7)	
• No	31 (88.6)	17 (100)	14 (77.8)	
• Unsure	1 (2.9)	0 (0)	1 (5.6)	
Do you agree people with a cervix should be given the option of HPV self-sampling?				.66
• Not at all	0 (0)	0 (0)	0 (0)	
• Minimally agree	0 (0)	0 (0)	0 (0)	
• Neutral	2 (5.7)	0 (0)	2 (11.1)	
• Moderately agree	5 (14.3)	3 (17.7)	2 (11.1)	
• Strongly agree	28 (80.0)	14 (82.4)	14 (77.8)	
In the future, what method would you prefer for cervical cancer screening?				.32
• I'd prefer the provider to take an HPV sample	7 (20.0)	4 (23.5)	3 (16.7)	
• I'd prefer to take my own sample	24 (68.6)	11 (64.7)	13 (72.2)	
• I'd prefer to continue with Pap testing	2 (5.7)	2 (11.8)	0 (0)	
• I don't know	2 (5.7)	0 (0)	2 (11.1)	
For most people, a Pap test should occur:				.63
• Every year	4 (11.4)	3 (17.7)	1 (5.6)	
• Every 3 years	27 (77.1)	12 (70.6)	15 (83.3)	
• Every 5 years	4 (11.4)	2 (11.8)	2 (11.1)	
I'd prefer cervical cancer screening to occur:				.57
• Every year	15 (42.9)	9 (52.9)	6 (33.3)	
• Every 3 years	11 (31.4)	4 (23.5)	7 (38.9)	
• Every 5 years	9 (25.7)	4 (23.5)	5 (27.8)	
HPV testing is so much more accurate than Pap testing that, for most people, a negative HPV test makes it safe to have an HPV test every 5 years. The risk of over testing is doing the test too often finds many minor abnormalities that correct on their own and can lead to stress and unnecessary treatment. Given this information, I'd prefer HPV testing to occur:				.30
• Every year	2 (5.7)	2 (11.8)	0 (0)	
• Every 3 years	7 (20.0)	4 (23.5)	3 (16.7)	
• Every 5 years	26 (74.3)	11 (64.7)	15 (83.3)	

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SURVEY QUESTION AND POSSIBLE RESPONSES	OVERALL (N=35), n (%)	FAMILY PRACTICE PARTICIPANTS (n=17), n (%)	SOCIAL MEDIA PARTICIPANTS (n=18), n (%)	P VALUE
There is new technology examining the ability to detect HPV in urine (pee) samples. If urine samples have similar accuracy to HPV tests that are collected by swabs, what would you prefer:				.85
• I'd prefer a Pap test	0 (0)	0 (0)	0 (0)	
• I'd prefer a provider-acquired HPV test (clinician uses speculum to obtain cervix swab)	1 (2.9)	1 (5.9)	0 (0)	
• I'd prefer HPV self-sampling (I collect a vaginal swab)	10 (28.6)	5 (29.4)	5 (27.8)	
• I'd prefer giving a urine sample to test for HPV	24 (68.6)	11 (64.7)	13 (72.2)	

HPV—human papillomavirus, Pap—Papanicolaou.

Table 4. Participant knowledge regarding HPV testing options

SURVEY QUESTION AND POSSIBLE RESPONSES	OVERALL (N=413), n (%)	FAMILY PRACTICE PARTICIPANTS (n=234), n (%)	SOCIAL MEDIA PARTICIPANTS (n=179), n (%)	P VALUE
Based on your current knowledge, do you think HPV testing would be better than Pap testing?				.03
• Yes	115 (27.8)	53 (22.7)	62 (34.6)	
• No	40 (9.7)	28 (11.9)	12 (6.7)	
• Unsure	251 (60.8)	149 (63.7)	102 (57.0)	
• Missing data	7 (1.7)	4 (1.7)	3 (1.7)	
Are you aware of the option of self-sampling for cervical cancer screening?				.03
• Yes	48 (11.6)	20 (8.5)	28 (15.6)	
• No	343 (83.1)	205 (87.6)	138 (77.1)	
• Unsure	15 (3.6)	5 (2.1)	10 (5.6)	
• Missing data	7 (1.7)	4 (1.7)	3 (1.7)	
Do you agree people with a cervix should be given the option of HPV self-sampling?				.77
• Not at all	3 (0.7)	3 (1.3)	0 (0)	
• Minimally agree	6 (1.5)	3 (1.3)	3 (1.7)	
• Neutral	26 (6.3)	14 (5.9)	12 (6.7)	
• Moderately agree	77 (18.6)	41 (17.5)	36 (20.1)	
• Strongly agree	291 (70.5)	167 (71.4)	124 (69.3)	
• Missing data	10 (2.4)	6 (2.6)	4 (2.2)	
In the future, what method would you prefer for cervical cancer screening?				.06
• I'd prefer the provider to take an HPV sample	141 (34.1)	83 (35.5)	58 (32.4)	
• I'd prefer to take my own sample	191 (46.2)	95 (40.6)	96 (53.6)	
• I'd prefer to continue with Pap testing	27 (6.5)	19 (8.1)	8 (4.5)	
• I don't know	45 (10.9)	31 (13.2)	14 (7.8)	
• Missing data	9 (2.2)	6 (2.6)	3 (1.7)	

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SURVEY QUESTION AND POSSIBLE RESPONSES	OVERALL (N=413), n (%)	FAMILY PRACTICE PARTICIPANTS (n=234), n (%)	SOCIAL MEDIA PARTICIPANTS (n=179), n (%)	P VALUE
For most people, a Pap test should occur:				<.01
• Every year	76 (18.4)	56 (23.9)	20 (11.2)	
• Every 3 years	309 (74.8)	162 (69.2)	147 (82.1)	
• Every 5 years	12 (2.9)	8 (3.4)	4 (2.2)	
• Missing data	16 (3.9)	8 (3.4)	8 (4.5)	
I'd prefer cervical cancer screening to occur:				.02
• Every year	207 (50.1)	133 (56.8)	74 (41.4)	
• Every 3 years	151 (36.6)	72 (30.8)	79 (44.1)	
• Every 5 years	36 (8.7)	19 (8.1)	17 (9.5)	
• Missing data	19 (4.6)	10 (4.3)	9 (5.0)	
HPV testing is so much more accurate than Pap testing that, for most people, a negative HPV test makes it safe to have an HPV test every 5 years. The risk of over testing is doing the test too often finds many minor abnormalities that correct on their own and can lead to stress and unnecessary treatment. Given this information, I'd prefer HPV testing to occur:				<.01
• Every year	68 (16.5)	47 (20.1)	21 (11.7)	
• Every 3 years	147 (35.6)	95 (40.6)	52 (29.1)	
• Every 5 years	181 (43.8)	85 (36.3)	96 (53.6)	
• Missing data	17 (4.1)	7 (3.0)	10 (5.6)	
There is new technology looking at the ability to detect HPV in urine (pee) samples. If urine samples have similar accuracy to HPV tests that are collected by swabs, what would you prefer:				.55
• I'd prefer a Pap test	8 (1.9)	6 (2.6)	2 (1.1)	
• I'd prefer a provider-acquired HPV test (clinician uses speculum to obtain cervix swab)	63 (15.3)	40 (17.1)	23 (12.8)	
• I'd prefer HPV self-sampling (I collect a vaginal swab)	89 (21.5)	47 (20.1)	42 (23.5)	
• I'd prefer giving a urine sample to test for HPV	237 (57.4)	133 (56.8)	104 (58.1)	
• Missing data	16 (3.9)	8 (3.4)	8 (4.5)	

HPV—human papillomavirus, Pap—Papanicolaou.

Overall, most participants lacked awareness that HPV causes most cases of cervical cancer and that HPV testing is available as a screening option. There was uncertainty regarding the superiority of HPV testing compared with Pap testing. There was also little awareness of HPV self-sampling for cervical cancer as a screening option. Findings are consistent with current literature demonstrating little is known about HPV testing and self-screening options and that, once informed, many people prefer HPV self-screening if the option is available.¹⁷⁻¹⁹

Social media participants showed greater knowledge about HPV testing than family practice participants. This difference may be attributed to self-selection bias in the social media group, as individuals motivated and informed about HPV testing may have been more likely to participate in the survey. While it cannot be confirmed, it is also possible social media posts were more likely to appear in social media feeds of those interested in this topic.

Most participants in this study preferred self-sampling for cervical cancer screening. This was higher

in the underscreened group, in keeping with a recent systematic review that found acceptability of self-sampling due to ease of collection, reduced embarrassment, comfort, and lack of pain.²⁰ Lesack and colleagues found those more accepting of HPV-based screening over Pap testing were more willing to complete subsequent self-collection.¹⁷

Participants in this study indicated they would also prefer to provide urine samples, if given the option. Literature shows urine sampling is preferred due to convenience and ability to collect samples at home.²¹⁻²³ A meta-analysis examining accuracy of cervical HPV detection in first-void urine reported a pooled sensitivity of 78% and specificity of 89% for high-risk HPV detection, compared with pooled sensitivity of 90% and specificity of 90% for cervical specimens.²⁴ If improvements are made, and if urine testing for HPV were to become more comparable to other screening methods, considering urine sampling as an option would be important for improving participation rates.²⁵


Prior to learning about cancer screening recommendations, participants preferred annual HPV cervical cancer screening, despite 74.8% being aware of the current 3-year Pap test interval. However, after receiving information about risks and benefits of HPV testing every 5 years, participants were more likely to prefer a 5-year interval. This interval had been found to be adequate, as long-term risk of high-grade preinvasive disease and cancers is low following a negative HPV DNA test.¹⁰ Nonetheless, 35.6% of participants still preferred 3-year intervals, indicating discomfort with extended screening intervals. Similarly, Smith et al found only 54% of their cohort was accepting of an extended screening interval, despite receiving education on this topic.²⁶ While there are advantages to an extended screening interval, it will be important to implement strategies to reduce unintended consequences, such as reductions in chlamydia testing, and missed treatment opportunities. This occurred in Ontario in 2012 when cervical cancer screening guidelines changed to less frequent screening and older age of onset.²⁷

This study identified potential mistrust regarding accuracy of self-sampling compared with provider-collected sampling. This is not uncommon and has been seen in both patients and providers.^{25,28} Several studies found similar accuracy between physician-obtained and patient-obtained samples for HPV testing.^{29,30} It is important to highlight benefits of self-sampling, as it can improve screening rates in underscreened communities lacking access to family doctors, in those with difficulty scheduling appointments, among patients with concerns about embarrassment or pain, and for those experiencing cultural barriers.^{22,31} Some patients will prefer provider sampling or require provider sampling due to mobility issues. These are important considerations when designing a screening program.

Limitations

Participants in this study were not reflective of the general Ontario population, as participants were highly educated individuals living in larger cities, most had family doctors, and most were up to date on Pap testing. The underscreened population is known to have lower knowledge of cervical cancer, HPV, and HPV testing,¹⁹ so this study demonstrates even in highly educated and screened populations, there are still knowledge gaps that need to be addressed when rolling out changes to screening programs. Another limitation of this study design was potential selection bias of participants by health care providers. Providers were given a written prompt to introduce the study to patients; however, patients were invited to participate in the study at the discretion of individual providers. Patients deemed to be good candidates may have been informed about the study. Those who received the family practice e-bulletin and hospital social media survey invitations had access to mobile devices or computers. Finally, the specific response rate is unknown, given the social media channels used for recruitment. Participants recruited through social media were compared with those with family practitioners to determine whether patients potentially without family physicians may have different readiness for HPV testing. This question could not be answered, as most people recruited through social media also had family physicians, and this group was similar to the recruited family practice group.

Conclusion

This study found a sample of Ontario residents preferred HPV testing and self-sampling over Pap tests. Preference was stronger among those without current screening. There are misconceptions and potential unintended consequences related to increased screening intervals and self-sampling. Educational campaigns should address these misconceptions and anticipate potential consequences to ensure successful transition to the new model and prevent drop-offs in screening rates. 

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Contributors

All authors of this paper have directly participated in the planning, execution, or analysis of the study; all have read and approved the final submitted version.

Competing interests

None declared

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This article has been peer reviewed.

Cet article a fait l'objet d'une révision par des pairs.

Can Fam Physician 2024;70:479-90. DOI: 10.46747/cfp.700708479