

High acceptability of HPV self-sampling in a Singapore primary care setting

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Dear Editor,

Cervical cancer, caused by persistent oncogenic human papillomavirus (HPV) infection, is a preventable disease with screening and vaccination.¹ However, there was an alarming decline in cervical cancer screening rates from 57.9% in 2007 to 43.1% in 2022² in Singapore. Women who do not attend cervical screening are at the highest risk of developing cervical cancer, and disparities in screening practices among ethnic and socioeconomic groups further drive health inequities in cervical cancer incidence.³ As conventional cervical cancer screening includes a pelvic examination by a health professional, barriers to screening include fear, discomfort and lack of time.⁴ HPV self-sampling, or self-collection with a vaginal swab, has equivalent accuracy with physician-sampling⁵ and may overcome these barriers to improve screening uptake. We had previously conducted a pilot study that demonstrated the acceptability of self-sampling among women attending a tertiary centre in Singapore,⁶ but data in the community is lacking. Our primary objective is to establish the acceptability of HPV self-sampling for cervical screening in primary care in Singapore, with a secondary aim to compare the concordance between self-sampling and nurse-sampling.

This was a qualitative acceptability study conducted at a polyclinic in Singapore from February 2023 to October 2024. Ethics approval from the National Healthcare Group's Domain Specific Review Board (2022/00191) and informed consent from all participants were obtained. Participants were recruited from a convenience sample of patients who attended the polyclinic. The inclusion criteria were Singaporean women aged 30–69 years who were scheduled to attend cervical cancer screening. The exclusion criteria were pregnancy, previous total hysterectomy, cervical cancer, immunosuppression and virgo intacta. We utilised a crossover trial design, with participants being randomised into 2 groups by block randomisation in a 1:1 ratio. A computer-generated randomi-

sation schedule was created and recorded on a concealed allocation list, which was strictly followed. Participants in Group 1 underwent nurse-sampling as per standard of care, followed by self-sampling with the COPAN FLOQswab® (Copan Diagnostics, CA, US; Supplementary Fig. S1); while Group 2 underwent the reverse sequence. All swabs were processed using Roche-Cobas 6800 HPV assay. Subsequently, participants completed an anonymous questionnaire on their experience (Supplementary Appendix 1). The participants' clinical management was not affected by the study.

Acceptability of self-sampling was quantified in terms of favourable perception among participants, and the likelihood for women to take up cervical screening with self-sampling. We estimated the acceptance rate for HPV self-sampling to be 85% with a precision of 5%, resulting in a sample size of 200. All data were analysed using SPSS version 20.0 (IBM Corp, Armonk, NY, US). Agreement of self- and nurse-collected HPV swab results were assessed using McNemar-Bowker test.

Out of the 228 enrolled participants, 28 (12.3%) women declined to complete the survey and survey data was analysed for the remaining 200 patients (Supplementary Fig. S2). The characteristics of the participants are summarised in Supplementary Table S1. The ethnic composition of the study population closely mirrored that of the Singapore population. Regarding practices of cervical cancer screening and prevention, a quarter of the women were never-screeners (25%), and most participants (90.5%) have not received the HPV vaccine. Only 18.5% of women reported ever using tampons.

Table 1 shows the breakdown of the participants' preferences regarding HPV sampling. The majority of them found self-sampling easy to perform (88%), and experienced minimal discomfort (88%). Only a minority reported to have felt anxious (4.5%), unpleasant (6.5%) or embarrassed (1.5%) during the process. When asked about their preferences for

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Table 1. Study participants' preferences regarding the 2 sampling collection methods (n=200).

	Yes	No		
Have you had any cervical cancer vaccinations?	19 (9.5%)	181 (90.5%)		
Have you ever had cervical cancer screening done (HPV ^a or PAP ^b smear)?	150 (75.0%)	50 (25.0%)		
Have you ever used tampons?	37 (18.5%)	163 (81.5%)		
Have you ever smoked?	18 (9.0%)	182 (91.0%)		
Experience on HPV self-sampling				
	Strongly agree	Agree	Neither agree nor disagree	Disagree
When taking my own HPV sample today, I found it easy	141 (70.5%)	35 (17.5%)	18 (9.0%)	4 (2.0%)
I felt comfortable taking my own HPV sample	143 (71.5%)	33 (16.5%)	16 (8.0%)	6 (3.0%)
I did not feel anxious taking my own HPV sample	146 (73.0%)	36 (18.0%)	9 (4.5%)	7 (3.5%)
I did not feel embarrassed taking my own HPV sample	177 (88.5%)	18 (9.0%)	2 (1.0%)	1 (0.5%)
It was not unpleasant for me to take my own HPV sample	156 (78.0%)	26 (13.0%)	5 (2.5%)	8 (4.0%)
If self-sampling and sampling by a doctor/nurse are equally good, what would you prefer in a future screening programme? (More than 1 option can be selected)				
Self-sampling at home	141 (56.6%)			
Self-sampling at health centre	56 (22.5%)			
Sampling by a doctor/nurse	20 (8.0%)			
Does not matter	32 (12.9%)			
Are you likely to participate in future cervical cancer screening if you have the option of self-sampling?				
Yes	183 (91.5%)			
No	17 (8.5%)			
If you have the option of self-sampling, would you be willing to pay for it?				
Yes	148 (74.0%)			
No	52 (26.0%)			

^a Human papillomavirus^b Papanicolaou

future screening, the majority preferred self-sampling at home (56.6%) or in a health centre (22.5%), over physician-sampling (8%). Most participants (91.5%) were more likely to participate in future cervical cancer screening if the option of self-sampling was available, and 74% of women were willing to pay for the self-sampling swab.

The HPV results of the self-sampling and nurse-sampling swabs are shown in Supplementary Table S2. Out of the 228 study participants, 10 women did not undergo nurse-sampling as they were currently menstruating and did not qualify for screening as per the polyclinic protocol. Nine self-collected samples yielded invalid results (4.1%), all of which were HPV-negative on nurse-sampling. Women who did not

undergo nurse-sampling or had invalid samples were excluded from the final analysis. Discordant results were only observed in 5 samples, with a concordance rate of 98.4% (95% confidence interval 95.3%–99.7%). There was no significant difference between the detection of HPV in the self-sampled and nurse-sampled results ($P=0.37$, McNemar test).

This study demonstrated the acceptability of HPV self-sampling among women who attended a primary care setting in Singapore. This supports findings from our pilot study,⁶ as well as studies in Asian countries with similar ethnic groups.⁷ Singapore is a multiracial country with a unique sociocultural context that influences women's attitudes towards self-examination and health literacy.⁸ These include cultural taboos,

traditional views of women's modesty and a preference for female physicians. Self-sampling in the primary care setting is able to circumvent these barriers by providing women with an acceptable method to undergo cervical screening without a pelvic examination. Furthermore, despite a low use of tampon products among our study population, this was not a barrier to self-sampling, which similarly required the insertion of a foreign body into the woman's vagina.

Our study findings from women who attended primary healthcare are encouraging, with a significant proportion of participants reported to have been never-screeners for cervical cancer. Primary care attendance has been shown to be positively associated with preventative health measures,⁹ hence offering HPV self-sampling as an alternative option for cervical cancer screening within primary care has the potential to engage under-screened women.¹⁰ More research is needed on cost-effective self-sampling delivery strategies and robust follow-up plans, to guide national policymaking. Future large-scale randomised control trials or real-world implementation studies are essential for this purpose.

In conclusion, the acceptability of HPV self-sampling among Singapore women in primary care is high. HPV self-sampling overcomes barriers of conventional cervical screening, and is the preferred choice for cervical cancer screening in our study population. The introduction of self-sampling will increase accessibility of screening to women at highest risk of cancer, thus strengthening Singapore's efforts to eliminate cervical cancer.

Supplementary materials

Table S1. Baseline demographic characteristics of study participants and non-participants.

Table S2. Breakdown of self-collected and nurse-collected HPV results (n=218).

Fig. S1. COPAN FLOQswab used for HPV DNA self-sampling test.

Fig. S2. CONSORT flow diagram on the enrolment of study participants.

Appendix 1. Participant survey.

Appendix 2. Non-participant survey.

Ethics statement

Ethical approval from the National Healthcare Group's Domain Specific Review Board (2022/00191) and informed consent from all participants were obtained.

Declaration

This study was funded by Singapore Cancer Society research grant 2021 (SCS-GRA-2021-00174). The sponsor did not play any role in study design; in the collection, analysis and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication. The authors have no affiliations or financial involvement with any commercial organisation with a direct financial interest in the subject or materials discussed in the manuscript.

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