

# Why are Young Women Referred For Opportunistic Cervical Tests Outside The Organized Screening Programme? A Survey Targeted To Healthcare Professionals.

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## Abstract

We aimed to study awareness, knowledge, and perceptions of cervical cancer screening and testing and national guidelines among Finland's healthcare professionals. We conducted an anonymous web-based survey, and 531 persons attended it. Professional education was the strongest predictor for good overall awareness and perceptions. Almost all respondents knew the screening program, but only 34% knew the target age. Contradicting current evidence-based guidelines, 48% considered that the first pap test for a screening purpose should be taken a few years after the onset of sexual activity. There are discrepancies among healthcare professionals in their perceptions of natural history, evidence of benefits and harm of screening among young women, and current guidelines on cervical testing services. Enhancing education and training in all professional groups involved in cervical sample-taking and referral and improved guidance with systematic monitoring of all testing services.

**Keywords:** cervical cancer screening, clinical practice guidelines, guideline adherence, provider survey.

## Introduction

The organized screening program is more effective with lower costs and causes less harm than opportunistic testing [1,2]. Therefore, international and national guidelines have been introduced to promote organized activities [1–3]. A well-organized screening program has predefined protocols, quality assurance for target ages, screening tests and intervals, and management protocols for screen positives. It is also regularly monitored and evaluated for benefits and harms. Opportunistic testing seldom adheres to these protocols, resulting in less cost-effective outcomes with a higher risk of injury.

The effectiveness of cervical cancer screening has been shown in several studies [2,4,5]. The impact is, however, dependent on age [6–14]. Screening under 30 years old women has been generally shown to have only little effect on the risk of cervical cancer, whereas the most evident risk reduction has been observed among women aged 35 years or over [2,9,13,14]. Transient HPV infections and resulting non-progressive cell atypia are prevalent in women under 30 [15–18]. Therefore, testing asymptomatic young women may significantly overdiagnose self-resolving abnormalities and overtreatment,

increasing overall costs and the risk for complications and psychological stress [2,19].

Extensive and frequent opportunistic testing, often subjected to younger women, coexists with organized screening in several European countries. This is evident also in Finland [20,21,22]. Even if cervical testing outside the screening program has shown to be effective in Finland, complementary testing among screening participants is arguable [9,14,23]. Indeed, since 2006, the national Current Care Guidelines (CC guidelines, available at: [www.kaypahoito.fi](http://www.kaypahoito.fi)) have directed healthcare professionals to reduce such opportunistic testing. Understanding the rationale of clinical practice contributing to opportunistic testing among young women allows the creation of policies to address the problem.

We conducted an anonymous online, web-based survey examining attitudes, knowledge, and practices on cervical cancer screening-related topics among healthcare professionals in Finland. This study explores how well the professionals know and follow the national

guidelines in their approach. We also assess various factors and their association with awareness and compliance.

## Material and Methods

An anonymous online, web-based survey was conducted in Finland in five cities (Espoo, Helsinki, Vantaa, Oulu, Kuopio) between March and June 2018. The survey was targeted to healthcare professionals in contact with cervical cancer testing and sexual health in their daily work, i.e., to doctors, public health nurses, midwives, and laboratory technicians in health centers, maternity and contraceptive clinics, student healthcare, gynecology outpatient departments and clinics, and private primary healthcare. Laboratory personnel was included in the survey because, in Finnish healthcare and the organized screening program, a trained laboratory technician often takes cervical tests. In each organization, the link to the survey was distributed to a local contact person whose task was to forward it to all personnel potentially involved with a referral of sample-taking for cervical tests. The contact persons reported that the number of recipients was altogether circa 3000. This figure also included overlaps, as one person could work in multiple organizations. One or two reminders were sent depending on the number of respondents in the area.

The survey included questions on knowledge, perceptions, and attitudes toward cervical cancer prevention, such as cervical cytology (pap test) or HPV test, the organized screening program, national guidelines, and the HPV vaccine. Questions on demographic background data were the only compulsory ones in the survey. Most of the questions were multiple-choice or multiple-response questions. The questionnaire also comprised open-ended questions to allow the

respondent to give accurate information on their perceptions. The questionnaire was created at the Finnish Cancer Registry using the Webropol survey tool.

In this study, we utilize information from 14 survey questions categorized into two groups. The first group of questions described healthcare professionals' *perceptions* of cervical cancer screening and their practices in daily clinical work. The second group told healthcare professionals' *awareness and knowledge* of the national screening program and the CC guidelines on cervical testing.

Each answer was scored based on clinical guidelines (the CC guidelines 2016 edition) and the Government Decree on Screening (**Table 1**). For each question, the correct answer or "I don't know" yielded 0 points, and each wrong answer resulted in a subtraction of one point (-1 point). The scoring of each survey question is presented in Appendix 1. Some questions were multiple-response questions that may have yielded more than one negative point if a respondent chose multiple wrong answers. Points from each survey question of the first group were summed into perception scores and *awareness and knowledge* scores from each question of the second group. These were further calculated into total scores consisting of points from all 14 survey questions. The possible range of perception, awareness, and knowledge scores and total scores varied from -21 to 0, -4 to 0, and - 25 to 0, respectively.

**Table 1:** The Finnish Government Decree on Screening and Finnish screening recommendations at in 2018 when the survey was performed.

	Target age of screening	Screening method
<b>Government Decree on Screening</b>	30–60 In some municipalities also women aged 25 and 65 are invited for screening*	Every 5 years, screening organized by municipalities
<b>The Finnish Current Care Guidelines</b>	< 25	No screening, diagnostic testing only if symptoms
	25—29	Every 5 years, pap-test as a primary test
	30—60 (65)	Every 5 years, HPV-test as a primary test (primarily within organized screening program)
Post-HPV-vaccination	(25-)30–60(-65)	Follow age-specific recommendations
Pregnancy, breast feeding, post-hysterectomy	(25-)30–60(-65)	Follow age-specific recommendations
Non-attendees to the organized screening program	(25-)30–60(-65)	Opportunistic testing if a woman has not been tested within 5 years

\* Since 2022 all women aged 30–65 years have been invited to screening.

## Statistical methods

Due to the jump logic in the survey questions (**Appendix 1**), the original survey questions were merged into 9 questions whose responses were first cross tabulated by professional groups (**Tables 3 and 4**). The effects of the various factors on the distributions of total

and perception scores were analyzed using a multiple linear regression model. Education and place of work (private or public healthcare) were used as independent variables in the model, and the model was also adjusted for age. The question "Have you read the

Current Care Guidelines" (yes or no) was used as an independent variable in the analyses of perception scores. R version 4.0.2 was used in all studies.

Ethical approval for this study was obtained from the Ethics Committee of Helsinki University Hospital (HUS/1215/2017).

## Results

A total of 531 healthcare professionals attended the survey. The response compliance in the selected 14 questions was good among the responders (> 97 % question). Nearly all (93 %) of the respondents were women. Age distribution was similar in all professional groups (**Table 2**). Most of the respondents, 80 %, worked in the Helsinki metropolitan region. The most common professional group among

respondents was public health nurses, then doctors, of which the majority were gynecologists and general practitioners (GPs). Most of the respondents worked in primary public healthcare and reported weekly or monthly contact with topics related to pap tests in their daily work (**Table 2**). Most respondents, 57 %, said referring women to pap tests, most of them being doctors.

**Table 2:** Demographics of the respondents

		Doctor	Nurse/ph nurse**/midwife	Lab. technician	Other	All
		n (%)	n (%)	n (%)	n (%)	n (%)
<b>ALL</b>		182 (34.2)	275 (51.8)	53 (10.0)	21(4.0)	531 (100)
<b>AGE</b>	<b>20-29</b>	17 (9.3)	59 (21.5)	12 (22.6)	3 (14.3)	91 (17.1)
	<b>30-39</b>	64 (35.2)	68 (24.7)	7 (13.2)	3 (14.3)	142 (26.7)
	<b>40-49</b>	48(26.4)	75 (27.3)	13 (24.5)	7 (33.3)	143 (26.9)
	<b>50-59</b>	31 (17.0)	59 (21.5)	11 (20.8)	7 (33.3)	108 (20.3)
	<b>60+</b>	21 (12.1)	14 (5.1)	10 (18.9)	1 (4.8)	46 (8.7)
<b>PLACE OF WORK</b>						
<b>Public health care</b>	<b>Laboratory</b>	0 (0.0)	6 (2.2)	17 (32.1)	10 (47.6)	33 (6.2)
	<b>Health center</b>	79 (43.4)	32 (11.6)	1 (1.9)	43 (14.3)	155 (29.2)
	<b>Student healthcare</b>	19 (10.4)	60 (21.8)	1 (1.9)	2 (9.5)	82 (15.4)
	<b>Maternity/contraceptive clinic</b>	37 (20.3)	105 (38.2)	0 (0.0)	0 (0.0)	142 (26.7)
	<b>Tertiary healthcare unit</b>	10 (5.5)	2 (0.7)	2 (3.8)	2 (8.3)	16 (3.0)
<b>Private health care</b>						
	<b>Laboratory</b>	0 (0.0)	0 (0.0)	22 (41.5)	1 (4.8)	23 (4.3)
	<b>Clinic</b>	44 (24.2)	21 (7.6)	4 (7.5)	2 (9.5)	71 (13.4)
<b>Private + public</b>		19 (10.4)	1 (0.5)	0 (0.0)	0 (0.0)	20 (3.8)
<b>Other</b>						30 (5.6)
<b>CITY</b>	<b>Metropolitan Helsinki region</b>	150 (82.4)	208 (75.6)	52 (98.1)	17 (81.0)	427 (80.4)
	<b>Rest of Finland</b>	30 (16.5)	67 (24.4)	1 (1.9)	4 (19.0)	102 (19.2)
	<b>*NA</b>	2 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.38)
<b>REFERRING TO PAP SMEAR</b>	<b>Yes</b>	170 (93.4)	113 (41.1)	14 (26.4)	7 (33.3)	304 (57.3)
	<b>No</b>	12 (6.6)	161 (58.5)	39 (73.6)	14 (66.7)	226 (42.6)
	<b>Don't know</b>	0 (0.0)	1 (0.4)	0 (0.0)	0 (0.0)	1 (0.2)
<b>DEALING WITH PAP SMEAR IN DAILY WORK</b>	<b>Daily</b>	30 (16.5)	20 (7.3)	13 (24.5)	3 (14.3)	66 (12.4)
	<b>Weekly</b>	76 (41.8)	78 (28.4)	24 (45.3)	11 (52.4)	189 (35.6)
	<b>Monthly</b>	44 (24.2)	79 (28.7)	6 (11.3)	0 (0.0)	129 (24.3)
	<b>Less frequently</b>	29 (15.9)	76 (27.6)	6 (11.3)	3 (9.5)	114 (21.4)
	<b>Don't known/NA</b>	0 (0.0)	7 (2.5)	1(1.9)	0 (0.0)	8 (1.5)

\*NA = no answer, \*\*public health nurse

### Awareness and knowledge of the Current Care Guidelines

The national screening program was generally well-known. Almost all respondents were aware of the federal screening program for cervical cancer (**Table 3**). Nearly all the respondents considered they knew how often women are invited for cervical cancer screening, and most knew the correct answer. However, most respondents believed they knew the target screening age in the municipality they worked in, but only one-third knew the actual age.

The CC guidelines were best known among doctors (**Table 3**). Altogether, 61 % of all the respondents were aware of them, and 36 % had read the guidelines, most of them being doctors. Only half of those familiar with the procedures knew when a woman is recommended to have her first pap test for screening purposes.

**Table 3:** Awareness and knowledge of the guidelines and screening programme. The correct answer is bolded.

Question	Answer	All (n=531)	Gyn* (n=71)	GP* (n=64)	Other MD* (n=47)	PH nurse* (n=191)	Nurse (n=40)	Midwife (n=44)	Lab. Tech.* (n=54)	Other (n=20)
At what age are women invited for screening in the municipality that you work in?	<b>25/30—60/65</b>	175 (33)	26 (36.6)	21 (32.8)	15 (31.9)	53 (27.7)	17 (42.5)	13 (29.5)	21 (38.9)	9 (45)
	Some other age	260 (49)	39 (54.9)	33 (51.6)	20 (42.6)	95 (49.7)	17 (42.5)	27 (61.4)	20 (37)	9 (45)
	I don't know or no answer	89 (16.8)	6 (8.5)	10 (15.6)	12 (25.5)	37 (19.4)	6 (15)	3 (6.8)	13 (24.1)	2 (10)
	Not aware of the national screening program	7 (1.3)	0 (0)	0 (0)	0 (0)	6 (3.1)	0 (0)	1 (2.3)	0 (0)	0 (0)
How often are women invited for cervical cancer screening in Finland?	<b>Every 5 years</b>	468 (88.1)	70 (98.6)	59 (92.2)	42 (89.4)	163 (85.3)	34 (85)	42 (95.5)	41 (75.9)	17 (85)
	Some other interval	9 (1.7)	0 (0)	1 (1.6)	0 (0)	4 (2.1)	0 (0)	0 (0)	2 (3.7)	2 (10)
	I don't know or no answer	47 (8.9)	1 (1.4)	4 (6.3)	5 (10.6)	18 (9.4)	6 (15)	1 (2.3)	11 (20.4)	1 (5)
	Not aware of the national screening program	7 (1.3)	0 (0)	0 (0)	0 (0)	6 (3.1)	0 (0)	1 (2.3)	0 (0)	0 (0)
Have you read the Current Care Guidelines on cytologic changes in the cervix, vagina, and vulva?	Yes	189 (35.6)	66 (93)	35 (54.7)	17 (36.2)	33 (17.3)	13 (32.5)	15 (34.1)	6 (11.1)	4 (20)
	No	132 (24.9)	3 (4.2)	17 (26.6)	10 (21.3)	51 (26.7)	13 (32.5)	14 (31.8)	19 (35.2)	5 (25)
	No answer	5 (0.9)	1 (1.4)	0 (0)	1 (2.1)	1 (0.5)	0 (0)	0 (0)	0 (0)	2 (10)
	Not aware of the guidelines	205 (38.6)	1 (1.4)	12 (18.8)	19 (40.4)	106 (55.5)	14 (35)	15 (34.1)	29 (53.7)	9 (45)
At what age at the earliest a woman is recommended to have a Pap test taken according to the Current Care Guidelines?	<b>30 or 25</b>	177 (33.3)	54 (76.1)	26 (40.6)	15 (31.9)	46 (24.1)	10 (25)	15 (34.1)	8 (14.8)	3 (15)
	Some other age	8 (1.5)	0 (0)	2 (3.1)	0 (0)	2 (1)	2 (5)	0 (0)	1 (1.9)	1 (5)
	I don't know or no answer	141 (26.6)	16 (22.5)	24 (37.5)	13 (27.7)	37 (19.4)	14 (35)	14 (31.8)	16 (29.6)	7 (35)
	Not aware of the guidelines	205 (38.6)	1 (1.4)	12 (18.8)	19 (40.4)	106 (55.5)	14 (35)	15 (34.1)	29 (53.7)	9 (45)
Mean awareness and knowledge score		-1.1	-0.9	-1.1	-0.9	-1.1	-1.1	-1.1	-1.0	-1.0

\* gynecologist, general practitioner, other medical doctor, public health nurse, laboratory technician, PH nurse = public health nurse

## Perceptions of cervical cancer screening

Regarding reasons for taking the first-ever pap smear for screening purposes, the onset of sexual activity was the most popular among all professional groups (**Table 4**). Most regarding a certain age as an indication for the first screening pap smear considered it 25 or 30 years.

In contrast to guidelines, almost half of the public health nurses and one-third of GPs, nurses, and midwives agreed that a pap smear should be avoided during pregnancy (**Table 4**). Only half of the doctors considered that a pap smear should not be taken during menstruation.

Nearly all respondents also considered pap smears necessary among HPV-vaccinated women (**Table 4**). A minority of all respondents thought taking a pap smear could also cause harm.

One-fifth of the respondents had not heard of the HPV test (**Table 4**). The most popular indication for an HPV test was a diagnostic reason among all the respondents. Excluding gynecologists, only 40 % of doctors regarded that HPV test should be used as a screening test. In contrast to the guidelines, over 30 % of all respondents considered that the HPV test does not have to be targeted to specific age groups or can be used among women younger than 30 years of age. Only 22 % of all respondents considered the target age group for HPV tests to be women aged 30 years or over.

**Table 4:** Perceptions on pap and HPV test. The correct answer is bolded. Table continues next page.

Question (respondent's own opinion is asked)	Answer	All (n=531)	Gyn* (n=71)	GP* (n=64)	Other MD* (n=47)	PH nurse* (n=191)	Nurse (n=40)	Midwife (n=44)	Lab. Tech* (n=54)	Other (n=20)
<b>In your opinion, when should a woman without any specific gynecological symptoms have her first pap test taken?***</b>	<b>At a certain age (30 or 25 years)</b>	178 (33.5)	39 (54.9)	32 (50)	19 (40.4)	48 (25.1)	14 (35)	13 (29.5)	9 (16.7)	4 (20)
	At certain age (some other age)	25 (4.7)	0 (0)	2 (3.1)	3 (6.4)	13 (6.8)	0 (0)	2 (4.5)	4 (7.4)	1 (5)
	A couple of years after the onset of sexual activity	252 (47.5)	25 (35.2)	26 (40.6)	19 (40.4)	102 (53.4)	19 (47.5)	27 (61.4)	23 (42.6)	11 (55)
	When a woman starts using contraception	40 (7.5)	1 (1.4)	0 (0)	1 (2.1)	13 (6.8)	6 (15)	1 (2.3)	14 (25.9)	4 (20)
	Some other	23 (4.3)	5 (7)	3 (4.7)	4 (8.5)	9 (4.7)	0 (0)	0 (0)	2 (3.7)	0 (0)
	I don't know/No answer	13 (2.4)	1 (1.4)	1 (1.6)	1 (2.1)	6 (3.1)	1 (2.5)	1 (2.3)	2 (3.7)	0 (0)
<b>How should an HPV-test be used in your opinion?***</b>	<b>As a screening test among women aged 30 years or more</b>	114 (21.5)	51 (71.8)	15 (23.4)	13 (27.7)	10 (5.2)	6 (15)	13 (29.5)	5 (9.3)	1 (5)
	As a screening test among women aged under 30 years	81 (15.3)	3 (4.2)	14 (21.9)	7 (14.9)	30 (15.7)	3 (7.5)	8 (18.2)	12 (22.2)	4 (20)
	As a screening test, age doesn't matter	96 (18.1)	7 (9.9)	9 (14.1)	8 (17)	24 (12.6)	9 (22.5)	9 (20.5)	25 (46.3)	5 (25)
	As a diagnostic test to find out the possible cause of a specific symptom	132 (24.9)	16 (22.5)	10 (15.6)	8 (17)	36 (18.8)	15 (37.5)	16 (36.4)	25 (46.3)	6 (30)

	For some other purpose	2 (0.4)	2 (2.8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	I don't know/No answer	1 (0.2)	0 (0)	0 (0)	1 (2.1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Has not heard of HPV-test	117 (22)	0 (0)	4 (6.3)	4 (8.5)	93 (48.7)	8 (20)	4 (9.1)	1 (1.9)	3 (15)
In your opinion, when do you not recommend having a pap test taken?*	During pregnancy	193 (36.3)	8 (11.3)	23 (35.9)	11 (23.4)	90 (47.1)	13 (32.5)	15 (34.1)	27 (50)	6 (30)
	<b>During menstrual bleeding</b>	358 (67.4)	35 (49.3)	38 (59.4)	25 (53.2)	146 (76.4)	25 (62.5)	30 (68.2)	47 (87)	12 (60)
	When breast feeding	41 (7.7)	3 (4.2)	5 (7.8)	2 (4.3)	21 (11)	2 (5)	2 (4.5)	5 (9.3)	1 (5)
	After total hysterectomy	61 (11.5)	13 (18.3)	8 (12.5)	11 (23.4)	22 (11.5)	5 (12.5)	2 (4.5)	0 (0)	0 (0)
	After menopause	7 (1.3)	0 (0)	0 (0)	2 (4.3)	3 (1.6)	2 (5)	0 (0)	0 (0)	0 (0)
	If a woman has been vaccinated against HPV	21 (4)	1 (1.4)	5 (7.8)	4 (8.5)	8 (4.2)	0 (0)	0 (0)	2 (3.7)	1 (5)
	I don't know/No answer	27 (5.1)	3 (4.2)	4 (6.3)	1 (2.1)	12 (6.3)	3 (7.5)	1 (2.3)	2 (3.7)	1 (5)
In your opinion, are there situations in which a pap test should not be taken for any reason?***	Yes	113 (21.3)	17 (23.9)	8 (12.5)	8 (17)	40 (20.9)	7 (17.5)	8 (18.2)	17 (31.5)	8 (40)
	<b>No</b>	300 (56.5)	49 (69)	44 (68.8)	24 (51.1)	100 (52.4)	24 (60)	27 (61.4)	23 (42.6)	9 (45)
	I don't know/No answer	118 (22.2)	5 (7)	12 (18.8)	15 (31.9)	51 (26.7)	9 (22.5)	9 (20.5)	14 (25.9)	3 (15)
In your opinion, can a pap test also cause harm for a woman? ***	<b>Yes</b>	136 (25.6)	41 (57.7)	32 (50)	21 (44.7)	27 (14.1)	3 (7.5)	6 (13.6)	4 (7.4)	2 (10)
	No	324 (61)	27 (38)	25 (39.1)	16 (34)	133 (69.6)	32 (80)	34 (77.3)	41 (75.9)	16 (80)
	I don't know/No answer	71 (13.4)	3 (4.2)	7 (10.9)	10 (21.3)	31 (16.2)	5 (12.5)	4 (9.1)	9 (16.7)	2 (10)
Mean perception score		-5.3	-3.7	-3.5	-4.3	-5.7	-5.4	-5.8	-7.8	-7.8

\* gynecologist, general practioner, other medical doctor, public health nurse, laboratory technician, PH nurse = public health nurse

\*\* multiple options can be chosen.

\*\*\* only one option can be chosen.

## Overall awareness and correct perceptions

The highest total score of a single respondent was 0, and the lowest was -16, respectively. By academic education groups, the mean total score (consisting of perceptions score and awareness and knowledge score) varied from -4.7 to -8.8, and the mean perception score from -3.5 to -7.8 (**Table 5**).

Academic education was the strongest predictor for good overall awareness and correct perceptions. Mean differences in scores followed education level systematically. All doctors gained higher scores compared to all nurses and laboratory technicians. Within all these three main education groups, differences were found to be minor and statistically insignificant. (**Table 5**)

After academic education, familiarity with the CC guidelines was the second strongest predictor for good overall awareness and correct perceptions. In addition, working in public healthcare or both in public and private healthcare predicted better understanding and accurate perceptions than working only in private healthcare. The difference was minor but statistically significant. Regarding age, perceptions were more often correct, and younger respondents' awareness of the guidelines was better. These results, however, were statistically insignificant. (**Table 5**)

**Table 5:** The multiple linear regression model: overall awareness and correct perception

	n	Mean perception scores	Mean total scores	Mean difference in scores	95 % CI	p-value	Mean difference. in scores	95 % CI	p-value
<b>All</b>	531			Coefficient of determination 26 %			Coefficient of determination 23.5 %		
<b>Education</b>									
Gynecologist	71	-3.7	-4.7	0			0		
General practitioner	64	-3.5	-4.7	+0.3	(-0.6,+1.1)	0.582	-0.3	(-1.3,+0.6)	0.478
Medical doctor other	47	-4.3	-5.2	-0.1	(-1.1,+0.9)	0.838	-0.6	(-1.6,+0.4)	0.221
Public health nurse	191	-5.7	-6.8	-1.4	(-2.3,-0.6)	0.001	-2.3	(-3.1,-1.6)	< 0.001
Nurse	40	-5.4	-6.5	-1.2	(-2.2,-0.2)	0.025	-1.9	(-2.9,-0.8)	0.001
Midwife	44	-5.8	-7.0	-1.8	(-2.8,-0.8)	0.001	-2.6	(-3.6,-1.5)	< 0.001
Laboratory technician	54	-7.8	-8.8	-3.3	(-4.3,-2.3)	< 0.001	-3.9	(-4.8,-2.9)	< 0.001
Other	20	-7.8	-8.8	-3.3	(-4.6,-2.0)	< 0.001	-4.0	(-4.8,-2.9)	< 0.001
<b>Working only in private healthcare</b>									
Yes	101	-5.7	-7.7	0			0		
No	430	-5.3	-6.1	+0.7	(+0.1,+1.3)	0.017	+1.0	(+0.4,+1.6)	0.001
<b>Has read The Current Care Guideline</b>									
No/no information	342	-6.1	*	0			*		
Yes	189	-4.1		+1.1	(+0.6,+1.6)	<0.001			
<b>Sex</b>									
Female	496	-5.4	-6.5	Not included in the model			Not included in the model		
Male	33	-4.5	-5.6						
Other	2	-5.0	-6.0						
<b>Age-group</b>									
20-29	91	-5.3		0			0		
30-39	142	-4.6	-6.3	0.0	(-0.7,+0.6)	0.894	-0.2	(-0.9,+0.6)	0.638
40-49	143	-5.7	-5.7	-0.6	(-1.3,0.0)	0.066	-0.8	(-1.5,-0.1)	0.034
50-59	108	-5.8	-6.7	-0.7	(-1.4,0.0)	0.056	-0.8	(-1.6,-0.1)	0.029
60+	47	-5.7	-6.9	-0.7	(-1.6,+0.2)	0.118	-0.8	(-1.8,+0.2)	0.112

\*Included in the total scores

## Discussion

Screening for young women after the onset of sexual activity has been adopted in many countries in earlier decades. It was then not known that at such a young age, precancerous lesions are largely non-progressive, and screening at that age does not decrease cervical cancer incidence or mortality. Excessive cervical testing, especially among young women, results in overdiagnosis and overtreatment. Therefore, to prevent unnecessary harm and costs of cervical testing, it is essential to examine the implementation of screening and testing guidelines in everyday clinical practice and, if necessary, consider interventions to enhance adherence. The need to avoid unnecessary testing becomes even more evident among HPV-vaccinated women. It has been shown that HPV vaccines significantly reduce the risk of cervical cancer [24]. It, therefore, seems HPV vaccines are an even more profitable strategy than screening in preventing cervical cancers in young women.

According to the Finnish CC guidelines (valid since 2006 and later editions, the latest 2021), there is no need to test asymptomatic women for cancer screening purposes below the age of 25. In our study, many respondents from all academic educational groups still perceived the start of sexual life as the most crucial reason for taking the first pap smear, which likely resulted in excessive opportunistic testing among younger women. Other perceptions could explain the extensive use of opportunistic testing, e.g., most respondents regarded that taking a pap smear does not cause harm, and pregnancy was thought to be a contraindication for cervical testing. Additionally, though nearly all the respondents knew about the nationally organized screening program, only one-third knew the starting age of the screening program in the municipality where they worked.

Overall, the findings of our study indicate that the progression of HPV infection and cellular atypia in young women and, further, the principles and criteria of screening are not sufficiently well understood. This is likely to affect also the information the healthcare personnel provide for women, e.g., on the benefits and harms of cervical testing.

Academic education was the strongest predictor for good overall knowledge and better awareness of the national screening program and the CC guidelines. Doctors of the leading educational groups read the guidelines more often than other professional groups, which is natural, as the guidelines are mainly meant for doctors. Nurses, particularly laboratory nurses involved in sample-taking, must be aware of the policies. Working only in private healthcare (i.e., not working parallelly in the public sector) predicted slightly lower overall knowledge and awareness.

Responses were scored and summed accordingly to assess an overview of various perceptions and knowledge. We chose an intuitive scoring method decreasing the overall score due to incorrect answers (which were scored to be -1s). Alternative scoring attempts

showed, however, that results and conclusions were robust to the scoring method (Results not shown).

The strengths of our study are the convenience sample of over 500 responses and the comprehensive response to all questions selected for the current research. Respondents represented diverse professional groups and organizations. Therefore, the results represent the perceptions and understanding of all healthcare personnel involved in cervical testing-related matters in our country. Reaching the healthcare professionals in contact with cervical cancer testing and sexual health in their daily work was essential because the perceptions and actions of these professionals have the most significant impact on clinical practice and guidance of women. The anonymous response encouraged participation in the survey and produced more honest and sincere answers. Our study offers important and unique information that can be used to develop interventions to affect the extensive opportunistic testing and improve adherence to national guidelines for cervical cancer screening.

As per limitations, no register-based data sources indicate who is involved regularly in the referral or sample-taking of cervical tests. Therefore, a proportion of personnel for whom the link to the questionnaire was mailed was not involved with such services. It is also possible that healthcare professionals more interested in and aware of the topics in question answered the survey more likely. Nevertheless, this potential selection among the responding personnel needs to consider our main findings on the severe shortcomings in the information and perceptions. Further, the densely populated Helsinki metropolitan region was overrepresented compared to the rest of Finland. Also, despite the anonymous responses, some of the respondents may have responded according to the guidelines rather than according to their actual actions in the daily clinical work.

In addition to the CC guidelines at the time of the study, there were similar articles in the Finnish healthcare portal Terveystietti (www.terveysportti.fi), a popular and easy-to-use web-based medical information for healthcare professionals. Thus, some information might contradict the CC guidelines used in this study. There may also be local instructions in healthcare organizations related to cervical cancer screening and sexual health affecting the daily clinical work. Survey studies examining healthcare professionals' awareness of and adherence to screening guidelines were conducted in the U.S. after the renewal of national screening guidelines in 2012 [25–31]. These studies showed differences between the knowledge and the practice since healthcare providers reported performing screening tests more frequently than recommended despite noting guidelines being essential and effective. In concordance with our findings, a survey study by the PROSPR consortium [32] reported that for cervical cancer screening, providers continued to screen women younger than age 21 if they were sexually active.

A 2020 published review reported over screening HPV tests and knowledge gaps among healthcare professionals and providers related to the superior sensitivity of the HPV test and age-specific guideline recommendations for HPV testing [29]. In our study, respondents also presented discrepancies regarding indication and appropriate target ages for HPV tests. In the Finnish screening program, the HPV test is recommended for women aged 30 years or above [3]. Uncertainty considering the use of HPV tests discovered among general practitioners is alarming. This raises a concern that opportunistic HPV tests could be used increasingly in primary healthcare, resulting in unnecessary positive test results and follow-up tests and treatments. Earlier studies from the U.S. reported that reasons for non-adherence to guidelines were concerns for malpractice and patient expectations, healthcare provider's distrust, disagreement, confusion, or lack of knowledge regarding the contents of the policies, health maintenance organization's endorsement towards the guidelines, and limited time to discuss risk and benefits of screening with patients [25,27,28,30–32]. Providers in hospital-based, group, and academic practices were more likely to follow the guidelines compared to professionals in non-hospital-based or solo practices [32,33]. Also, age or number of years since medical school and medical specialty affected adherence to guidelines; younger professionals and gynecologists were more likely to report compliance [28,32,33]. Our study partly corroborates these findings.

### Implications of the study

Enhancing education and training is essential to improve healthcare professionals' adherence to guidelines. Establishing internal

instructions following the national policies and reaching all critical education groups in healthcare organizations could effectively provide correct and compact information to support decision-making in clinical practice. It is also essential that all widespread data sources used by healthcare professionals in their daily work are updated according to the latest national guidelines. Contradictions in provided information should be avoided.

However, is enhancing education and providing updated web-based information sufficient? Appropriate follow-up of such educational activities is needed. Furthermore, systematic interventions that drive individual healthcare professionals and entire healthcare organizations to follow the guidelines more effectively should be considered. For example, centralized registration of all tests including opportunistic testing and testing based on clinical indications should be arranged [34]. In Finland, only trials in the organized screening program are registered centrally in the Finnish Cancer Screening Registry. By centralized registration of all tests, proper evaluation of the effectiveness of screening and systematic quality assurance would be possible. In addition, routine quality assurance should be a condition for accessing public funding for the service.

Research on the target screening group is also needed to improve the organized screening program and attendance in screening. We have already conducted a survey that will report awareness and attitudes on cervical cancer screening among young Finnish women. This survey will complement the information gained from healthcare professionals bringing forth the perspective of women.

### Author contribution

Petra Makkonen: writing – original draft, project administration, conceptualization, investigation

Anni Virtanen: writing – review and editing, conceptualization, supervision

Aku Leivonen: writing – review and editing, methodology, formal analysis

Tytti Sarkeala: writing – review and editing, conceptualization,

Pekka Nieminen: writing – review and editing, conceptualization,

Nanna Sarvilinna: writing – review and editing, conceptualization,

Ahti Anttila: writing – review and editing, conceptualization, supervision

Sirpa Heinävaara: writing – review and editing, conceptualization, methodology, supervision

**Conflicts of interest:** AV, PN and AA have been involved in writing the Finnish guidelines for cervical testing. AA and PN have been furthermore involved in producing the European quality assurance guidelines for cervical cancer screening. We declare no other potential conflicts of interests.

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## Appendix 1: Survey questions concerning perceptions, awareness, and knowledge.

SURVEY QUESTIONS CONCERNING PERCEPTIONS	
Q1: In your opinion, when should a woman without any specific gynecological symptoms have her first pap test taken? <sup>i</sup>	Score
At a certain age	0
A couple of years after the onset of sexual activity → Jump to Q3	-1
When a woman starts using contraception → Jump to Q3	-1
Some other → Jump to Q3	-1
I don't know → Jump to Q3	0
No answer → Jump to Q3	0
Q2: At what certain age? <sup>ii</sup>	
25—30	0
Other	-1
No answer	0
Q3: How often should a woman without any specific gynecological symptoms have a screening pap test taken (every ____ years)? <sup>ii</sup>	
5	0
Other answer	-1
No answer	0
Q4: A 26-year-old woman has had a pap test three years ago. The result of the pap test was normal, and the woman is symptomless at the moment. In which situations mentioned below you would consider the woman should have a pap test also now? <sup>iii</sup>	
Before starting to use hormonal contraceptive	-1
Always when having a gynecological examination regardless of the reason for the examination or potential symptoms	-1
After pregnancy and labour	-1
After abortion	-1
None of these	0
I don't know	0
No answer	0
Q5: A 37-year-old woman has had a pap test three years ago. The result of the pap test was normal, and the woman is symptomless at the moment. In which situations mentioned below you would consider the woman should have a pap test also now? <sup>iii</sup>	
Before starting to use hormonal contraceptive	-1
Always when having a gynecological examination regardless of the reason for the examination or potential symptoms	-1
After pregnancy and labour	-1
After abortion	-1
None of these	0
I don't know	0
No answer	0
Q6: In your opinion, when do you not recommend having a pap test taken? <sup>iii</sup>	
During pregnancy	-1
During menstrual bleeding	0
When breast feeding	-1
After total hysterectomy	-1
After menopause	-1
If a woman has been vaccinated against HPV	-1

I don't know	0
No answer	0
<b>Q7: In your opinion, are there situations in which a pap test should not be taken for any reason? <sup>i</sup></b>	
Yes	-1
No	0
I don't know	0
No answer	0
<b>Q8: In your opinion, can a pap test also cause harm for a woman? <sup>i</sup></b>	
Yes	0
No	-1
I don't know	0
No answer	0
<b>Q9: How should an HPV test be used in your opinion? <sup>iii</sup></b>	
As a screening test	0
As a diagnostic test to find out the possible cause of a specific symptom	-1
For some other purpose	-1
I don't know	0
No answer	0
<b>Q10: At what age should an HPV test be used as a screening test? <sup>i</sup></b>	
Among women aged under 30 years	-1
Among women aged 30 years or more	0
Among women aged 35 years or more	0
Age does not matter	-1
I don't know	0
No answer	0
<b>SURVEY QUESTIONS CONCERNING AWARENESS AND KNOWLEDGE</b>	
<b>Q11: At what age are women invited for screening in the municipality that you work in? <sup>ii</sup></b>	
25/30—60/65	0
Some other age	-1
No answer	0
<b>Q12: How often are women invited for cervical cancer screening in Finland (every__years)? <sup>ii</sup></b>	
5	0
other	-1
No answer	0
<b>Q13: Have you read the Current Care Guidelines on cytologic changes in the cervix, vagina, and vulva? <sup>i</sup></b>	
Yes	0
No → Jump to the end	-1
No answer → Jump to the end	0
<b>Q14: At what age at the earliest a woman is recommended to have a Pap test taken according to the Current Care Guidelines? <sup>i</sup></b>	
25	0
Other	-1
No answer	0

i. one of the options can be chosen.

ii. free numerical answer

iii. multiple options can be chosen.

iv. depending on respondent's municipality