

Original article

## Students' knowledge about cervical cancer and vaccine against human papillomavirus (HPV)

**Marta Maksimiuk<sup>1</sup>, Aleksandra Sobiborowicz<sup>1</sup>, Olga Beranek<sup>1</sup>, Maria Sobol<sup>2</sup>, Anna Maria Badowska-Kozakiewicz<sup>2</sup>**

<sup>1</sup> Cancer Cell Biology Students Research Group, Department of Biophysics and Human Physiology, Medical University of Warsaw, Poland

<sup>2</sup> Department of Biophysics and Human Physiology, Medical University of Warsaw, Poland

### ABSTRACT

**Introduction:** Human papillomavirus (HPV) is the most common sexually transmitted virus worldwide. It's associated with over 99% of cases of cervical cancer and also connected with other cancers like rectal, vaginal or penile.

**Aim:** To evaluate the level of knowledge about cervical cancer and HPV vaccine among students attending medical and non-medical universities and to discuss problems connected with low interest in cancer prevention.

**Materials and methods:** 427 students took part in the anonymous survey. Original questionnaire consisted of 19 questions and was prepared by the authors powered by review of valid references.

**Results:** 93.2% of interviewees have heard about HPV vaccine and 20.6% of them have been vaccinated. There was a statistically significant difference in knowledge and attitude to vaccination and cancer prevention between medical and non-medical students.

**Discussion:** Interviewees are aware of hazards involved in HPV infection, but they don't know the exact scale of it. They cannot evaluate the risks connected with cervical cancer properly, what may influence their low interest in prevention. Knowledge about HPV vaccine's existence is common, but there is a huge disinformation about its characteristics and side effects. Main source of knowledge are mass media, subject of vaccination is discussed at school or with general physician extremely rarely. The price of the vaccine is main reason for resignation, so regional government's prevention programs play a very important role.

**Conclusions:** The education of the society is a strong base for excellent prevention of cancers. Doctors should be included in more active operations for cervical cancer prevention.

**Key words:** prevention, HPV, vaccination, cervical cancer

### Correspondence:

Marta Maksimiuk  
Department of Biophysics  
and Human Physiology,  
Medical University of Warsaw  
02-004 Warsaw, Chałubińskiego 5  
phone: 691-230-268  
e-mail: marcioszka.m@gmail.com

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## INTRODUCTION

Human papillomavirus (HPV) is the most common sexually transmitted virus worldwide and in addition, diseases connected with this virus cause significant morbidity and mortality. Cervical cancer is the fourth most common cancer among women all over the world, while in Poland it takes sixth place [1, 2]. In Poland cervical cancer prevalence reaches medium level in comparison to other countries. Incidence rate connected with cervical cancer has been decreasing since the '80 – in 2011 3078 onsets (standardized coefficient – 10.3/100,000) and 1735 deaths (standardized coefficient – 5.1/100,000) were observed. HPV infection causes almost all incidences of cervical cancer and high-grade cervical dysplasia and moreover 90% cases of rectal cancers, 70% of vaginal, 50% of penile, 40% of vulvar and 13–72% of nasopharyngeal cancers. HPV types known for oncological high risk (16 and 18) cause approximately 70% of cervical cancer and 80–90% of other HPV-associated malignancies. On the other hand, low risk HPV types (6 and 11) are responsible for 90% of genital warts [3, 4]. Prophylactic bivalent (2vHPV) and quadrivalent (4vHPV) vaccines are commonly used all over the world. Moreover, in a few countries the nine-valent vaccine against HPVs 6, 11, 16, 18, 31, 33, 45, 52, 58 has been approved recently [5–7]. The main aim of each mentioned vaccine is to prevent from developing cervical intraepithelial neoplasia (CIN2 and CIN3), pre-invasive cervical disease and cervical cancer connected with HPVs 16 and 18 [1].

Although pre-invasive cervical disease is said to be treatable in almost 100% of cases, the second stage of cancer development is connected with only 50% of patients cured [8]. Therefore prophylactic such as cervical cytology and vaccines are able to prevent from cancer development and allow quick diagnosis and effective treatment. Unfortunately in Poland cervical cancer treatment seems to be still inefficient – the 5-year survival rate in 2010–2015 was accounted for 55.1%, while reaching 60–80% in other European countries. The main reason for this is connected with diagnosing Polish patients in late stages of cancer development [8]. At this point it is worth mentioning that in 2015 attendance rate to Polish screening cervical cytology amounted to 42.1% [9]. Therefore we decided to discuss this crucial subject and evaluate the level of knowledge about cervical cancer and HPV vaccine among students. Education and society awareness have direct impact on level of prevention and percentage of early detected preinvasive cancers.

## AIM

The main aim of this study was to evaluate the level of knowledge about cervical cancer and HPV vaccine among medical and non-medical students and discuss problems connected with low society interest in prevention.

## MATERIALS AND METHODS

Our study was conducted among 427 students aged 18–34 (SD = 2.15). Women amounted to 86.9% of respondents, while men – 13.1%. Responders were divided into two groups – students attending medical universities – 60.7% and non-medical universities – 39.3%. Moreover medical students were divided into faculty of medicine and other faculties (including dentistry, biotechnology, pharmacy).

Students' knowledge was assessed with use of anonymous survey, participation in which was voluntary. The original questionnaire was drafted by the authors on the basis of literature review for the purpose of this study. It consisted of 19 questions (18 closed and 1 open). Questions were divided into two sections – the first one concerned HPV vaccine and the second – cervical cancer and HPV infection (tab. 1).

The results were statistically analysed using Chi-square test and the Fisher exact test when the expected count was less than 5. Differences were considered statistically significant at  $p \leq 0.05$ .

TABLE 1.

The questionnaire with correct answers.

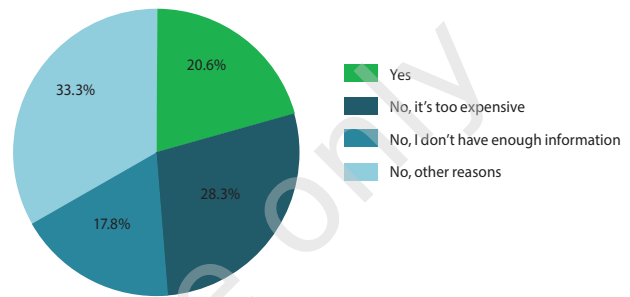
Part I – knowledge about vaccines against HPV	
Question	Correct answer
Have you heard about vaccine against HPV?	-
Do you believe that vaccination against HPV should be obligatory in Poland?	-
What age is recommended for vaccinating against HPV?	between 9–13 years old [10]
Are there any indications for vaccinating boys?	yes [10]
How many doses of vaccine do you think are given?	3 doses [5–7, 10]
Were you vaccinated against HPV?	-
Would you consider vaccinating against HPV, if the vaccine was refunded?	-
What were your sources of knowledge about the vaccine against HPV?	-
What are the side effects associated with the vaccine against HPV? [multiple-choice question]	fever, urticaria, breathing disorders
Do you think that someone who is already suffering from genital warts associated with HPV infection has indications for being vaccinated against HPV?	yes [10, 11]

Part II – knowledge about cervical cancer	
Which of the following neoplasms are associated with HPV infection? [multiple-choice question]	cervical cancer, vulvar cancer, laryngeal papillomatosis, vaginal cancer, penile cancer [12–14]
Which of the following are routes of human papillomavirus infection? [multiple-choice question]	direct contact, sexual contacts, self-infection, perinatal infection, infection by objects [15, 16]
Which of the following are factors predisposing to HPV infection? [multiple-choice question]	multiple sexual partners, HPV infection, tobacco smoking, diet low in vegetables and fruits [17, 18]
What percentage of cervical cancer cases are associated with HPV infection?	100% [19]
Which of the following symptoms would make you see a doctor? [optional multiple-choice question addressed to women]	unusual vaginal discharge, bleeding during sexual intercourse, irregular menstrual bleeding, lower abdominal pain, edema of lower limbs [18, 20]
Have you ever had cervical cytology? [optional question addressed to women]	-
How often do you think cervical cytology should be performed?	once in 3 years [21]
Knowing that every year around 3000 women in Poland are diagnosed with cervical cancer, what percentage of them die because of this disease, according to you?	60% [18]
Do you believe that cervical cancer mortality rate in your country is related to the prevention program?	-
Who do you think should get vaccinated against HPV? [open question]	-

## RESULTS

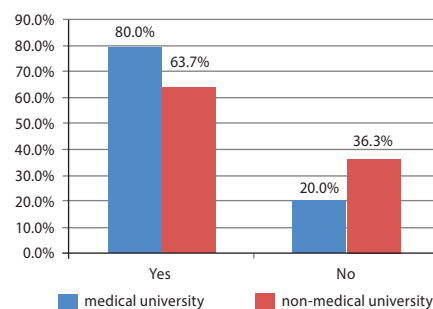
The first analyzed problem concerned students' knowledge about HPV vaccine and their opinions about the legitimacy of taking it. 93.2% of responders have previously heard about HPV vaccine and 20.6% were vaccinated. Most of the interviewees (28.3%) declared that they resigned from vaccinations because of high cost and what is more, 88.1% of individuals would immunize themselves if the vaccine was refunded (fig. 1).

FIGURE 1. Percentage distribution of respondents' answers to the question: „Were you vaccinated against HPV?“



The second most common reason for giving up vaccination against HPV (17.8%) was lack of knowledge about benefits and risks connected with immunization. The statistically significant difference ( $p < 0.037$ ) was detected between students attending medical and non-medical universities in the interest in refunded vaccination (90.7% vs 83.9%). Moreover, statistically significant difference ( $p < 0.001$ ) was observed between their knowledge about HPV vaccine existence (99.2% vs 83.9%) and their attitude towards establishing HPV vaccination as obligatory – 80% of medical students considered it advisable whereas only 63.7% non-medical students shared this view (fig. 2).

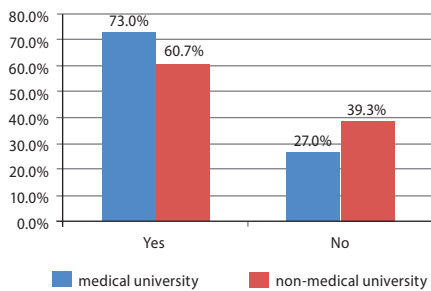
FIGURE 2. Comparison of answers from respondents attending medical and non-medical universities to the question: „Do you believe that vaccination against HPV should be obligatory in Poland?“



50.6% of respondents pointed age 9–13 as the most appropriate for vaccination. Students of the faculty of medicine answered this question correctly more often in comparison to other faculties with statistical significance ( $p < 0.015$ ). Among students of non-medical universities only 36% of them knew the correct answer. 55.2% of students identified correct number of vaccine's doses, whereas 68.1% correctly answered the question about recommendation for vaccinating boys against HPV (fig. 3). This question demonstrated statistically significant difference ( $p = 0.008$ ) between medical students with 73% correct answers and non-medical (60.7% correct).

FIGURE 3.

Comparison of answers from respondents attending medical and non-medical universities to the question: „Are there any indications for vaccinating boys?”

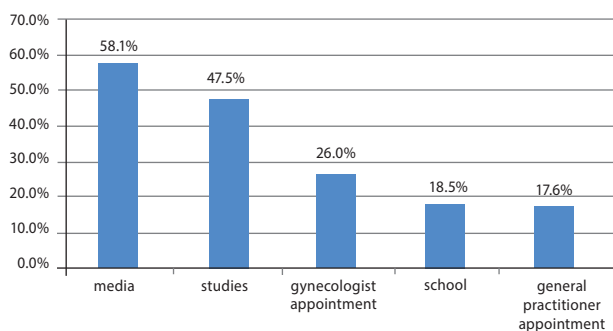


Responders presented extended knowledge about necessity of cervical cytology even after immunization (97.9% answers that cytology is needed), whereas their awareness about recommendation for vaccination of individuals who have been exposed to HPV was evaluated as low (only 55% correct answers). Medical and non-medical students answered both questions with similar percent of correct answers.

In multiple-choice question about sources of respondents' knowledge about vaccination against HPV the most numerous group (58.1%) pointed out media. The second most common answer was classes during studies (47.5%). What is more, this answer was the most common among medical students. Less frequently chosen answers included: gynecologist appointment (26%), general practitioner appointment (17.6%) and school classes (18.5%) (fig. 4). At this point it is worth mentioning that 97% of respondents believe that cervical cancer mortality is connected with prevention programs in given country.

FIGURE 4.

Percent distribution of respondents' answers to the multiple-choice question: „What were your sources of knowledge about the vaccine against HPV?”

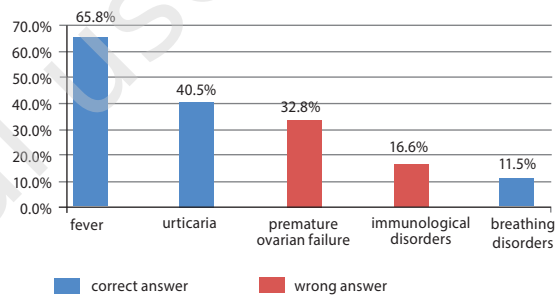


Vaccine, like any other medicine, have known side effects. In multiple-choice question about HPV vaccine's side effects 32.7% of

respondents wrongly chose primary ovarian insufficiency and 16.6% – immunological disorders. Summary of the product characteristics points out fever and urticaria as frequent side effects – they were also chosen by substantial percentage of respondents (respectively 65.8% and 40.5%). On the other hand, only 11.5% of respondents chose rare side effect that is breathing disorders (fig. 5).

FIGURE 5.

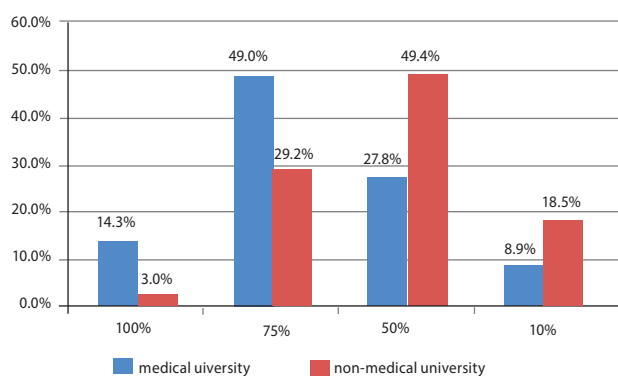
Percent distribution of respondents' answers to the multiple-choice question: „What are the side effects associated with the vaccine against HPV?”



The second analyzed problem concerned students' knowledge about cervical cancer. Only 9.8% of respondents connected percentage of cervical cancer with HPV infection properly, that demonstrates low level of their awareness of cervical cancer risk factors. Additionally, a statistically significant difference was observed ( $p < 0.001$ ) between medical and non-medical students' answers. Notably, 14.3% of medical students chose correct answer, whereas among non-medical student percentage of correct answered amounted to 3% (fig. 6).

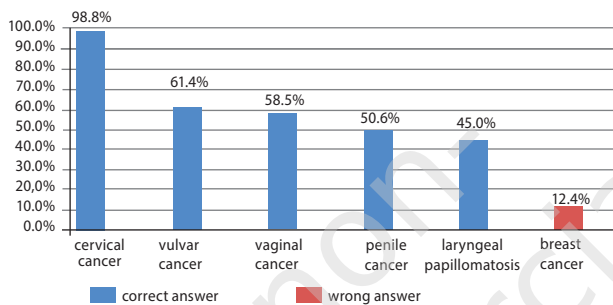
FIGURE 6.

Comparison of respondents' answers attending medical and non-medical universities to the question: „What percentage of cervical cancer cases are associated with HPV infection?”



In multiple-choice question about neoplasms connected with HPV infection 98.9% of respondents pointed out cervical cancer. Additionally, substantial percentage of students chose vulvar cancer (61.4%), vaginal cancer (58.5%), penile cancer (50.6%) and laryngeal papillomatosis (45%). What is more, 87.6% correctly rejected breast cancer as one of the answers (fig. 7).

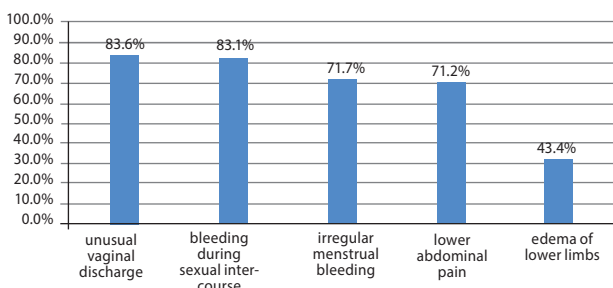
**FIGURE 7.** Percent distribution of respondents' answers to the multiple-choice question: „Which of the following neoplasms are associated with HPV infection?”.



Respondents demonstrated extended awareness about important role of prophylaxis in cancer prevention. 74.2% believe that cervical cytology should be carried out once a year, moreover 62.5% of surveyed women have already underwent prophylactic cytology. Interestingly, when we distinguish a subgroup of medical faculty students, the percentage of respondents participating in the cytological screening tests is even lower – 58.4%.

Surveyed women were asked to point out symptoms, that would concern them enough to visit gynecologist. All of the mentioned symptoms were connected with possible cancer development. Common answers were unusual or unpleasant vaginal discharge and bleeding during sexual intercourse (respectively 83.6% and 83.1%). The rarest answer was edema of lower limbs, chosen by 43.3% of women (fig. 8).

**FIGURE 8.** Percent distribution of respondents' answers to the multiple-choice question: „Which of the following symptoms would make you see a doctor?”.



In multiple-choice question about ways of transmitting HPV (all answers were correct), 96.5% respondents chose sexual contacts and 59.7% perinatal infection. Among medical students 15.6% of them chose 4 or more answers, whereas only 7% of non-medical students did so. This difference was found to be statistically significant ( $p < 0.001$ ) (tab. 2).

**TABLE 2.** Number of answers given by respondents attending medical and non-medical universities to the multiple-choice question: „Which of the following are routes of human papillomavirus infection?”.

Which of the following are routes of human papillomavirus infection? [multiple choice question]: direct contact, sexual contacts, self-infection, perinatal infection, infection by objects				
Number of answers	1	2	3	4 or more
Medical university	15.6%	44%	24.9%	15.6%
Non-medical university	33.9%	37.5%	21.4%	7.1%

Among risk factors associated with cervical cancer 97.2% of respondents chose HPV infection. Other common answers were: multiple sexual partners (87.1%) and smoking tobacco (44%).

Only 19.9% of respondents correctly answered the question about percentage of women dying because of cervical cancer. The most common answer was “40%” (45.9% of students) and the rarest – 80% (3%).

## DISCUSSION

Neoplasms still comprise a developing problem of Polish society. In 2015 81,632 new cases of malignancies were reported and 2,694 of them were cervical neoplasms [2]. Cervical cancers is globally covered by cytology screening test programs thus its incidence has been decreasing in countries with similar to Polish economic development [8]. In addition, the introduction of vaccination against human papillomavirus can effectively reduce cervical cancer morbidity and mortality [12]. According to WHO guidelines and many international gynecological and oncological societies, optimal prophylaxis includes primary prophylaxis, consisting of counseling and vaccination, as well as secondary prophylaxis – cytological screening tests [22, 23].

The most important risk factor for cervical cancer is chronic infection with oncogenic human papillomavirus types. HPV infections are connected with more than 99% of cervical cancer cases [19]. In our study, 97.2% of respondents indicated HPV infection as one

of the factors predisposing to the development of cervical cancer, but only 9.8% correctly associated the correlation between HPV infection and cervical cancer. This indicates that respondents are aware of the risks of HPV infection, but do not know the scale of the risks. In the study conducted among students of the Medical University of Lodz and the University of Lodz by Chorążka, the results were slightly more concerning, as only 60% of the respondents saw the relationship between cancer and HPV infection. The majority of respondents (65%) indicated a low level of personal and sexual hygiene as the main risk factor [24]. It is worth noticing that this research was conducted in 2007, so our better results may indicate a growing public awareness of HPV infections and its risks.

The majority of the respondents (93.2%) knew about the existence of the vaccine against HPV. However, a statistically significant difference in knowledge between medical and non-medical university students was noted (99.2% vs. 88.9%). Similar results were obtained by Mędreła-Kuder et al. (2014) – 92.5% of the students of physiotherapy (medical university) knew about the existence of the vaccine, while only 60% of the students of chemical technology (non-medical university) had the same knowledge [25].

Bivalent and quadrivalent vaccines are currently used in Poland. They are administered in a cycle of 3 doses (0–1–6 or 0–2–6). Vaccination is most advisable before sexual initiation, preferably at the age of 9–13 years, but it is also recommended for girls aged 13–18 years who have not been vaccinated earlier, or for those who need to complete the series of vaccinations started later. There are also indications for vaccinating boys, especially if vaccination against HPV concerns a small percentage of women in the population, which is the case in Poland [10]. In our study, only 20.6% of respondents were vaccinated and those were only women. Moreover, 31.9% of respondents believe that vaccination of boys is not recommended. However, in the data quoted by the Polish Gynecological Society, the potential benefits of vaccination for men include increased population immunity, interruption of the HPV transmission chain, and protection against HPV-dependent cases of penile cancer and genital warts [10]. The characteristics of the vaccine product showed equivalent immunogenicity against HPV types contained in this vaccine in boys and girls aged 9–15 years and in men aged 16–26 years as compared to girls and women aged 16–26 years [7]. The introduction of a universal vaccination against HPV program, covering both girls and boys before sexual initiation, can prevent significant morbidity and mortality associated with HPV infection [1, 26]. The HPV vaccine is not refunded. Among non-vaccinated people completing the questionnaire, the high price was the

main reason for giving up vaccination. Moreover, 88.1% of people expressed their willingness to vaccinate if the vaccination was for free.

All vaccinated women should carry out cytological tests in the standard model, as these vaccines do not protect against every type of HPV that can cause cervical cancer [10]. Almost all respondents (97.9%) saw the need for regular cytology after vaccination. However, only 55% of them believed that HPV DNA-positive people should be vaccinated against HPV, while in such case there are indications for vaccination as well [10]. There are also cases described in which vaccination against HPV accelerated the healing process of HPV-dependent papillae in the oral cavity [11].

Both bivalent and quadrivalent vaccines did not show many side effects during clinical trials. The most frequently reported side effects were urticaria, injection site pain, fever and headaches, while breathing disorders caused by bronchospasm were rarely reported [5, 6, 10]. However, no side effects such as premature ovarian failure or immunological disorders were observed. At this point it is worth noting that these unconfirmed side effects are often repeated in anti-vaccination campaigns. There are more and more articles in the media on the harmfulness and ineffectiveness of these vaccines. On the other hand, the American Academy of Pediatrics clearly stated that there are no links between premature ovarian insufficiency or immune system disorders and HPV vaccination [27]. Moreover, 32.8% of respondents chose immune system disorders as one of the side effects of vaccination against HPV, and 16.4% – premature ovarian failure. The answers to this question point to significant misinformation, both in terms of vaccine characteristics and possible side effects, which may be related to the source of knowledge about the vaccine (57.9% of respondents chose the media as one of their sources of knowledge). It is worrying that only 43.6% of the respondents obtained information on HPV vaccination from gynecologists and general practitioners, and only 18.5% of the respondents had this issue brought up at school. This shows the scale of the problem, which is the lack of knowledge about cancer prevention at the age when vaccination against HPV is the most recommended according to WHO [10].

Infection with the human papillomavirus is related to the development of many neoplasms. The most commonly described are: cervical cancer, vulvar cancer, vaginal cancer, penile cancer and nasopharyngeal cancer [12–14]. In our study, almost all respondents (98.8%) correctly indicated that cervical cancer is associated with HPV infection, a much smaller percentage of respondents chose other neoplasms, and 12.4% of them mistakenly chose

breast cancer as HPV-dependent (fig. 7). Although there are many known risk factors for breast cancer, such as childlessness, short breastfeeding, hormone replacement therapy or excessive alcohol consumption, HPV infection is not one of them [28].

HPV infection can spread through sexual contacts (vaginal, oral, anal) as well as through direct contact, objects or as a result of self-infections. In addition, female virus carriers can infect the baby during pregnancy and childbirth through contact with reproductive tract secretions [15, 16]. In 2017, Finnish physicians described cases of HPV DNA in breastfeeding mothers' milk. Interestingly, the spouses of these women, not their children, were infected by oral mucosa [29].

Adolescent women and men should know the risk factors of a given type of cancer in order to accept the need to participate in prevention and screening programs. The most important risk factors for cervical cancer include: prolonged infection with the human papillomavirus, a large number of sexual partners, young age of sexual initiation, smoking tobacco and a diet poor in fruit and vegetables [17, 18]. The majority of respondents are aware of the risks associated with HPV infection and a large number of sexual partners, while they are much less aware of other risk factors, and 15.6% of respondents mistakenly chose childlessness as a risk factor. In a study conducted by Cholewicka et al. (2007) it was observed that none of the 100 women were able to identify the majority of risk factors [30]. However, in the Mędrła-Kuder et al. (2014) study, the results showed that the majority of physiotherapy students correctly indicated factors increasing the risk of disease, while students of chemical technology had incomplete knowledge of the subject [25].

Intraepithelial dysplasia (CIN, cervical intraepithelial neoplasia), which is a pre-cancerous lesion, and cervical cancer often do not give any symptoms. The earliest symptoms that may indicate the disease development include contact bleeding, irregular menstruation and unusual discharge or changes in the mucus. Subsequent symptoms may include abdominal pain, lower extremity swelling and dysuric symptoms [18, 20]. In our study, 55.8% of the surveyed women indicated 4 or more symptoms that would make them to go see a doctor. The most frequently chosen answer was unusual vaginal discharge (83.6%), the least frequently – edema of lower limb (43.4%), which belongs to late symptoms of cancer progression. In a study conducted by Gawron et al. (2016) among nursing and physiotherapy students, the most frequently indicated symptom of cervical cancer was bleeding between regular monthly bleeding (84.5%), followed by abundant vaginal discharge

(71.8%) [31]. However, all these symptoms usually indicate an advanced stage of cervical cancer, which is why it is so important to detect pre-cancerous lesions at an early stage by means of cytological examination [18].

In our survey 62.5% of women declared that they had undergone a cytological examination. The results are similar to those obtained by Paśławska et al. (2014), according to which 65% of respondents – patients of randomly selected therapeutic entities aged 18–30 years – had a cytological examination [32]. Taking into account the fact that 60.7% of the respondents were students of medical universities, the percentage of respondents participating in this screening study should be higher. Interestingly, when we distinguish a subgroup of medical faculty students among the respondents, the percentage of respondents participating in the cytological tests is even lower – 58.4%. At this point it is worth noting that 97% of the respondents believe that cervical cancer mortality is related to the prophylaxis program in a given country, and 74.2% – that a cytological examination should be performed once a year. Therefore, the question arises as to why there is such a large discrepancy between observance of prophylaxis recommendations and the conviction that it is important in the prevention of cancer.

In Poland, cytological screening tests as secondary prevention of cervical cancer were implemented in 2006. Screening program includes women aged 25–59 who have not had cytology performed over the past 3 years [18]. Unfortunately, the screening rate for cervical cancer in Poland is very low – in 2015 it reached only 42.1% [9]. International experience shows, that prevention program based on cytological screening tests may significantly reduce mortality rate due to cervical cancer. However, in order for it to work, high attendance of patients from target group is required. The Finnish cervical cancer screening model, which led to a dramatic reduction in cervical cancer mortality of around 80%, is considered the best in the world. Implementing such an effective screening program requires well-organized system, high expenditures on social education and proper training of medical personnel [18, 33, 34]. In a study conducted by Podolska et al. (2013) on a group of students of pedagogy and sociology, it was pointed out that sources of knowledge about cervical cancer prevention program is highly limited. Majority of respondents expressed the opinion that cytological screening tests should be included in obligatory periodic medical examination of employees [34].

For every 100 thousand of Polish population there are 262 deaths due to malignancies [2]. Around 3000 women are diagnosed

with cervical cancer annually in Poland. The mortality rate associated with the disease is very high – reaching 60% [18]. In our study, correct answer to the question about cervical cancer mortality was given only by 19,9% of the respondents. This shows that the public is not fully aware of the risk of cervical cancer, which may be reflected in low interest in prevention program. Part of the primary prevention is vaccination against human papillomavirus, the main subject of our survey. It been on the list of recommended vaccinations since 2008, not financed from public funds [35]. Due to the strength of immune response and clinical effectiveness, vaccinating before sexual initiation is the most beneficial one, therefore general practitioners and paediatricians should play crucial role in the education of the society. In our study only 17,6% of the respondents were informed about the vaccine against HPV from their general practitioners or paediatricians. It is worth mentioning, that in accordance with the act on preventing and combating infections and infectious diseases, the physician's duty is to inform parents about mandatory and recommended vaccines to which an HPV vaccine belongs [36]. The 10-year-old check-up is the optimal moment to carry out a conversation about cervical cancer prevention with parents according to the recommendations of the group of experts chaired by professor A. Chybicka [37].

Free vaccinations against human papillomavirus are offered by some local prevention programs. An example is the *Prevention program for human papilloma virus (HPV), including cervical cancer for the city of Poznań for 2016–2018*. It provides free vaccinations for girls and boys from the age of 13, and in subsequent years of the program planned for 3 years, joining of new participants entering the age which enables the vaccination. Educational campaign is being carried out in order to encourage parents to actively participate in the vaccination program. Information is provided through local media, websites, posters and leaflets. In addition, students are informed about the program during classes, and their parents receive these messages during interviews and other meetings with the pedagogical group. After completion of the program, the assessment of the attendance will be carried out, with special attention paid to the population that did not take full part in the vaccination program [38]. Similar

preventive measures are taken in many cities and communes, eg in Kielce, Katowice, or in the Piaseczno commune [39–41]. Those are excellent examples of developing positive behaviour patterns regarding primary cancer prevention.

Specialist courses for nurses and midwives in the field of preventive vaccinations are conducted in Poland, the purpose of which is to prepare midwives to carry out vaccinations, including vaccination against HPV, important for epidemiological reasons. They also include deepening participants' knowledge about the vaccine itself and its role in preventing cervical cancer [42]. It would also be advisable to organize conferences and trainings for students and doctors, especially general practitioners, as well as paediatricians, to discuss the issue of primary cancer prevention, with particular emphasis on the role of the vaccine against human papillomavirus. The most important function of general practitioners and paediatricians seems to be to provide information to parents, as it enables the vaccination of children at an optimum age, as well as spreading reliable information on the course of vaccination and possible side effects.

## CONCLUSIONS

1. In the course of school education, too little time is devoted to the topic of cancer prevention and the development of positive health behaviour patterns.
2. The low percentage of vaccinated people results from the insufficient education of the society about human papillomavirus and cervical cancer, lack of reliable information from doctors about vaccination and its high costs.
3. Proper education of the society is the basis of cancer prevention programs. Education regarding the prevention of human papillomavirus infection should concern especially children/adolescents before puberty – before sexual initiation.
4. Physicians should be more involved in the prevention of cervical cancer, in spreading knowledge about human papillomavirus and cervical cancer, and informing patients about the existence and efficiency of the vaccine against human papillomavirus.

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