

Review

Cervical Cancer Prevention: The Role of the Nurse and Medical Care in Primary and Secondary Cancer Prevention

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Abstract

Objective: Although these days the priority is to fight the Covid-19 pandemic, the importance of human papillomavirus (HPV) infection is not to be neglected. **Mechanism:** Cervical cancer is caused mainly by a chronic infection with one or more of the high-risk subtypes of HPV—most commonly a sexually transmitted disease acquired early in life. Most HPV infections go away on their own, but some can lead to a precancerous state that, if left untreated, can undergo complete neoplastic transformation. **Findings in Brief:** There is a hope that in the future the combination of screening tests with vaccinations against oncogenic strains of HPV will allow reductions in the percentage of those contracting cervical cancer. **Conclusions:** The importance of educational activities should be emphasized in developmental gynecology in the context of oncological prevention. The roles of both doctors and nurses are important here. During the Covid-19 Pandemic, these kinds of activities are not to be abandoned. In addition, efforts should be made to develop more practical and workable HPV and cervical screening strategies for use during a pandemic.

Keywords: gynaecology; oncology; girls; HPV

1. Introduction

Although today the priority is the fight against the Covid-19 pandemic, the importance of human papillomavirus (HPV) infection is not to be neglected. Early prevention of infections with HPV is an element of primary prophylaxis against cervical cancer. Vaccines are available that prevent long-lasting oncogenic infections and serotypes of HPV.

There is a hope that in the future the combination of screening tests with vaccinations against oncogenic strains of HPV will allow reductions in the percentage of those contracting cervical cancer. These actions are related to the holistic care of girls and women, which is of essential importance always, and in the period of the Covid-19 pandemic, has a special significance.

Cervical cancer is caused mainly by a chronic infection with one or more of the high-risk subtypes of HPV (human papillomavirus)—most commonly a sexually transmitted disease acquired early in life. Most HPV infections go away on their own, but some lead to a precancerous

state that, if left untreated, can undergo complete neoplastic transformation. Both the incidence and mortality of cervical cancer have fallen drastically over the last 30–40 years due to successful screening (Pap smear), a significant increase in the quality of treatment, and the emergence of an effective HPV vaccine [1].

It is estimated that 690,000 cases of cancer in the world in 2020 and 3000 in Poland in 2015 were associated with HPV infections. During the Covid-19 pandemic, both the number of cervical screening visits and the rate of HPV infection decreased dramatically by 80% [2], while the isolation periods significantly reduced HPV transmission. After the pandemic was under control, both the number of cervical cancer screening visits and the HPV infection rate rapidly returned to baseline. The National Oncological Strategy for 2020–2030 in Poland assumes a recommencement of the vaccination processes for girls in 2021 and for boys in 2026, and vaccination of at least 60% of adolescents by 2028. It also provides for the need to conduct an information campaign on the benefits of p-HPV vaccination



and, according to 2020 expert panels, should be an integral part of the comprehensive prevention of cervical cancer in Poland [3–5].

Currently, HPV vaccinations are included in the list of vaccinations recommended in 2021 in Poland especially for people before sexual initiation, but not yet financed. The Agency for Health Technology Assessment and Tariffication in 2021 issued a recommendation for reimbursement of 9-valent vaccination for people over 9 years of age. There was also a lack of clinical trials assessing the effectiveness of HPV vaccines in the long term, which would allow an assessment of the impact of the intervention on the incidence of cervical cancer [6].

Human papillomavirus (HPV) is responsible for the development of the vast majority (90%–99%) of cervical cancer cases.

Human papillomavirus exists in nature in over 100 subtypes. Some of them can be the reason behind changes with the morphology of warts on the skin or benign anogenital venereal warts. The influence of other more aggressive types can participate in the development of malignant tumours, mainly cervical cancer in women and penile cancer in men.

From among the several hundred existing types of this virus, some of them show highly oncogenic activity, i.e., activity leading to cancerous changes that can be localized within the cervix, the anus, penis, head, neck and larynx. HPV viruses of type 16 and 18 that are mostly detected in Polish patients are responsible for about 70% of all cases of cervical cancer. It is estimated that over a whole life, even 80% of the population can have contact with at least one types of this virus. The spread and oncogenic potential of particular high-risk types of HPV differ. Mostly aggressive types of HPV, 16 and 18, and less frequently 31, 33, 35, 39, 40, 43, 51, 52, 53, 54, 55, 56 and 58 are mentioned [7–9].

2. Preventive Measures

In the context of prophylactic actions in gynaecology for developmental aged children, the risk of cervical cancer appearing can be significantly reduced through vaccinations against highly oncogenic types of HPV and also by conducting regular cervical smears [10–12]. There is irrefutable proof of the connection between the early start of sexual life and the risk of the development of cervical cancer—the immature metaplastic epithelium of the cervix is especially sensitive to the activity of oncogenic HPV [13–19].

HPV is transmitted mostly by sexual contact, and infection with HPV is diagnosed mostly in sexually transmitted infections. The problem is greater for another reason, in that while the use of a condom can protect against HIV and other viral infections, in the case of HPV it is not always sufficient, as it sometimes happens that virions, i.e., single particles of this virus, are small enough to be able to pass through this form of protection.

It is necessary to emphasize that it is also possible to be infected with HPV as a result of contact with the skin of an infected person or one whom is a symptomless carrier of the virus, including also indirect contact, for example by using the same towel, underwear or a common shower. It is also important that there is a risk that the children of HPV infected mothers can be infected during pregnancy or delivery.

• Factors that increase the risk of infection with HPV are:

- early age of sexual initiation
- large number of sexual partners
- coexistence of other sexually transmitted infections
- smoking tobacco
- use of hormonal contraception
- states of immunodeficiency (for example; due to infection with HIV or the use of medicines reducing immunity).

HPV can be present for many years in the body and not cause any symptoms of infection, but can come out due to states of immunodeficiency [16–19].

Most infections caused by HPV proceed without symptoms and die out within 1–2 years from infection. However, in some cases it happens that the virus is able to survive in the body for many years, leading to a gradual development of unfavourable changes in epithelial cells, resulting in among other things harmless warts, so called anogenital venereal warts, and also cervical cancer.

Currently already over 100 types of HPV viruses cause a variety of infections within the skin and mucous membranes, including about 40 types that are responsible for infections of the genitourinary system, of which at least 13 are highly oncogenic types.

In the European population 8 of those (namely 16, 18, 31, 33, 35, 45, 56 and 58) are of special importance, with the two first types (16 and 18) responsible for about 70% of all cases of cervical cancer. Infections with these viruses can also lead to tumours in other places, including among other things the anus, penis, vulva, mouth and larynx.

The development of cervical cancer as a result of HPV infection progresses slowly and lasts usually at least over ten years—on average from 20–25 years. Mostly, before cancerous cells appear, cells with features of dysplasia that can be detected during a cervical smear appear in the epithelium of the cervix.

The group with the highest risk of contracting cervical cancer is mainly those women who do not carry out a cervical smear, do not report to gynaecological examinations regularly and are not vaccinated against HPV.

Unfortunately infection with HPV proceeds in most cases symptomlessly or gives unspecific symptoms with no great intensification, for example leucorrhoea, itching or burning in intimate regions or the appearance of warts just in the moment of full development of the infection.

It is also possible that cervical cancer will not give any

characteristic clinical symptoms for a long time. However, in some women the following symptoms appear:

- leucorrhoea and bleeding from the vagina
- lower abdominal pains and pains in the sacral region
- pain after intercourse or a gynaecological examination
- heavier than usual menstrual bleedings

In the case of observing any of the mentioned symptoms it is necessary to report to a gynaecologist immediately and carry out diagnostic examinations, above all a cervical smear and molecular examination for infection with HPV and any urogenital infections (i.e., infections of genitourinary system).

Unfortunately a large number of women forget about prophylactic examinations and ignore for long time warning signals that their organism sends. The everyday rush, dozens of tasks to do, concern for remaining family members or focussing on professional duties can make it difficult to find the time to take care of themselves and their health. Proper prophylaxis and early detection of cervical cancer can significantly increase their chances for a long life at full strength and health [13–16]. Taking prophylactic and educational actions is especially important in the gynaecology of developmental aged children.

It is worth pointing out that over the past years the progress in molecular biology and the possibility of precise diagnostics of HPV infection are in addition to cervical smears as the next element of prophylaxis of cervical cancer. Tests for HPV not only significantly increase the effectiveness of early detection of pathological changes, but also allow a determination of the risk of developing a tumour and a more accurate care of patients (carriers of the virus), since infection with HPV is frequently preceded by the appearance of cellular changes that are visible in a cervical smear (anomalies in epithelial cells, atypia).

Advanced molecular-genetic technologies allow us to interpret more precisely cervical images (especially these ambiguous images—so called ASC-US) and a precise evaluation: an infection with HPV, what type of virus caused the infection, if infection with an oncogenic type of HPV has a persistent character and is related to the risk of progression up to advanced pre-cancerous changes (CIN 2/3 or HSIL) and further cervical cancer [16,17].

To minimize the risk of contracting cervical cancer, it is necessary to protect against infection with HPV. The best way is protective vaccinations against the highly oncogenic types of the virus, and brings the highest effectiveness if conducted from 11–13 yrs old. Although today the priority is the fight against Covid-19, the importance of HPV infection is not to be neglected. Analysis of literature related to the Covid-19 pandemic, the sexual health of women, as well as the philosophy of medicine, and medical observations from gynaecological practices during the pandemic, indicate the specificity of the problems that arose with the pandemic. Holistic care for patients is important, and the

gynaecologist plays a special role in the holistic care of women and girls, also in the context of any infections. It is important to promote vaccinations against both HPV and Covid-19 [20–23].

Also, in the aspect of gynaecology of development age, an essential fact is that physicians fulfil their tasks in a whole team of other physicians and medical services and nursing personal, and this is of special importance in this team as in this area.

This importance expresses itself not only in providing care according to medical recommendations and performing typical nursing activities, but also in taking actions that are essential for the promotion of health and prophylaxis of diseases, in health-promoting education and in the context of sexual education, and not just in patients in development age themselves, but also their parents and carers [23,24].

3. Protective Vaccinations and Health Education as an Essential Element in the Fight against Cervical Cancer

Vaccination against HPV reduces the risk of developing precancerous lesions in the form of cervical intraepithelial neoplasia (CIN). In a study conducted on 23.6 thousand women, Arbyn *et al.* [25] diagnosed CIN2 + in 2 out of 10,000 in the vaccinated group, compared to 164 out of 10,000 in the unvaccinated group. The obtained results clearly indicate that the risk of developing pre-cancerous lesions was 99% lower among the group of vaccinated women (relative risk (RR) [95% confidence interval (CI)] = 0.01 [0.00; 0.05]).

In another systematic review, Rey-Ares *et al.* [26] indicated that the vaccinated group had a 55% and 86% lower risk of developing CIN2 + lesions due to HPV16 and HPV18 infections, respectively (RR [95% CI] = 0.45 [0.38; 0.54] and RR [95% CI] = 0.14 [0.08; 0.25]), relative to the unvaccinated women. Studies by Lu *et al.* [27] indicate a 53% risk reduction in developing CIN2 + associated with HPV16 (RR [95% CI] = 0.47 [0.36; 0.61] in the ITT population (intention-to-treat, as planned) and a 96% reduction in the risk of developing CIN2 + associated with type 16 (RR = 0.04 [0.01; 0.11]) in women without prior HPV infection and with a complete vaccination course.

It should be strongly emphasized that the occurrence of CIN is not synonymous with the development of cervical cancer. Tejada *et al.* [28] indicated that the use of the 4-valent vaccine reduced the risk of condylomata acuminata associated with HPV types 6, 11, 16 and 18 by 62% (RR [95% CI] = 0.38 [0.32; 0.45]) versus the placebo control group. A significant reduction in the risk of HPV infection and diseases associated with HPV infection in unvaccinated men and women is observed with a minimum of 20% of vaccinated persons in both women and men. Elimination of new infections should be observed in at least 80% of vaccinated persons. A meta-analysis by Drolet *et al.* [29], including vaccinations of over 50% of girls, indicates a re-

duction in the incidence of HPV types 16 and 18 by 64% (RR [95% CI] = 0.36 [0.25; 0.53]).

Health education should be aimed at increasing the level of awareness of the positive role of vaccination, and thus also immunization. However, as indicated by Fu *et al.* [21], it is still a very complex topic without the possibility of indicating strong evidence allowing to focus on a specific educational intervention as a recommendation for widespread use. In addition to vaccinations, the aim of education should also be to strive for such behaviors, which will be primarily conducive to the prevention of infections, and also the prevention of diseases caused by HPV, including cervical cancer.

Health education should cover several groups due to their roles. School-based immunization programs have been shown to have a positive effect on increasing immunization rates, as both adolescents and their parents have insufficient awareness and knowledge of HPV infection and immunization. One of the recommended actions is to enable access to reliable sources of information. Health education should cover such topics that are relevant to increasing the level of immunization.

The main concerns among parents include side effects of vaccination and vaccine safety [22]. Another issue significantly affecting the level of vaccination is the public's conviction about the impact of vaccination on the increase in sexual activity. However, in Kasting *et al.* [30], they showed that people who decide to vaccinate against HPV declare a lower number of sexual partners and a lower number of risky sexual behaviors, undergoing sexual initiation at a later age. In addition, the authors noted a lower number of unplanned pregnancies and abortions. Information and encouragement from health-care professionals also influence the decision to vaccinate [31]. On the other hand, Dempsey *et al.* [32] proved that among physicians, the practical skills of conducting conversations with patients, acquired during the workshops, were the most useful. In addition, there is an increase in the acceptance of HPV vaccinations among parents and their children when such recommendations are provided by a doctor. In the study by Vanderpool *et al.* [33], a higher rate of implementation of the HPV vaccination schedule was reported in the intervention group, i.e., with the use of educational and vaccination reminder interventions consisting of: sending reminder letters to parents/guardians; sending text messages/e-mails/automated messages/phone reminders; disseminating educational brochures/leaflets, educational DVDs and telephone reminders.

Based on the presented data, it can be safely concluded that HPV vaccination (both the 2-valent and 4-valent vaccine) is characterized by a favorable safety profile, with a slightly higher risk of adverse vaccine reactions (NOP) compared to the control group. The most common NOPs included swelling at the site of the vaccine injection, joint pain in the area of systemic changes, pain, erythema and

edema, fever, systemic effects, and headache.

The World Health Organization indicates that HPV vaccination should be part of a coordinated and comprehensive strategy for the prevention of cervical cancer and other HPV-induced malignancies. Such strategies, in addition to vaccination, should also include educational activities on the reduction of behaviors that increase the risk of HPV, training of medical personnel, information activities aimed at women on the available forms of support, and increasing access to services in the field of screening, treatment and palliative care. It is advisable to promote/disseminate knowledge/data on the relationship between HPV infection and the development of malignant neoplasms as well as the safety and efficacy of available vaccines in the prevention of HPV infections and the development of precancerous lesions. The recommendations also emphasize that HPV vaccination is the primary preventive intervention, but this use does not eliminate the need for cytology-based cervical cancer screening later in life.

Given the rapid increase in HPV infections after the pandemic, which reached almost 20%, it is recommended to strengthen screening for HPV and cervical cancer to limit the spread of HPV infection. In addition, more practical HPV screening strategies need to be developed during a pandemic. Recent studies suggest that taking cervical cancer screening samples at home and sending them to the hospital for further testing may be an effective method of screening for HPV and cervical cytology during a pandemic [34,35].

4. Conclusions

There is a hope that in the future the combination of screening tests with vaccinations against oncogenic strains of HPV will facilitate reducing the percentage of those contracting cervical cancer. These actions are related to the holistic care of girls and women, which is of essential importance always, and in the period of the Covid-19 pandemic has a special significance.

Author Contributions

KPR, GJB, PM, MPK, KB, TG, MGL, MDM designed the manuscript. KM, EJ, AL, KK, DL, WK provided help and advice on the manuscript. EJ, AL, KM, KK, DL, WK collected and interpreted of data. KPR, GJB, PM, MPK, KB, TG, MGL, MDM, KM, EJ, AL, KK, DL, WK wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

Ethics Approval and Consent to Participate

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Conflict of Interest

The authors declare no conflict of interest. KPR, PM and GJB are serving as one of the Guest editors of this journal. We declare that KPR, PM and GJB had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to AS.

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