REVIEW

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Knowledge and attitudes of medical staff and medical students towards human papilloma virus (hpv) infections and vaccinations – literature review and implications for health education

Wiedza i postawy personelu medycznego oraz studentów kierunków medycznych wobec zakażeń wirusem brodawczaka ludzkiego (hpv) i szczepień ochronnych – przegląd literatury i implikacje dla edukacji zdrowotnej

Magdalena Sobalik[1], Monika Fabiś-Czajkowska[2], Wojciech Kapała[3*], Małgorzata Wojciechowska[4]

[1]*District Chamber of Nurses and Midwives, Poznań Medical Academy of Prince Mieszko I, Poznań*

[2]*Medical Vocational School, Wielkopolska Self-Governing Center for Vocational and Continuing Education No. 1, Poznań*

[3]*Higher School of Health, Beauty, and Education, Poznań; Medical Vocational School, Wielkopolska Self-Governing Center for Vocational and Continuing Education No. 1, Poznań*

[4]*Department of Maternal and Child Health, Department of Practical Midwifery Education; K. Marcinkowski Medical University, Poznań*

***Correspondence:**

Abstract

Effective prevention of human papillomavirus (HPV) infections is a global public health challen ge, and its success depends largely on the knowledge and attitudes of medical

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personnel. Selected studies on this topic demonstrate that the level of this knowledge varies significantly depending on the medical profession and country, often revealing significant gaps, especially in detailed information about the virus and the vaccine. Furthermore, literature analysis demonstrates a clear gap between knowledge and practice – despite generally positive attitudes toward vaccination, HPV vaccination rates among healthcare professionals and medical students remain low. This indicates the need to implement systematic and targeted educational interventions for medical professionals (physicians, nurses, midwives) and among medical students, which is crucial for improving the quality of counseling and increasing public acceptance of vaccinations.

Keywords: HPV, healthcare professionals, knowledge, attitudes, vaccination.

Streszczenie

Skuteczna profilaktyka zakażeń wirusem brodawczaka ludzkiego (HPV) stanowi globalne wyzwanie dla zdrowia publicznego, a jej powodzenie zależy w dużej mierze od wiedzy i postaw personelu medycznego. Jak wynika z wybranych badań w tym temacie poziom tej wiedzy jest bardzo zróżnicowany w zależności od rodzaju medycznej grupy zawodowej i kraju, często ujawniając istotne braki, zwłaszcza w zakresie szczegółowych informacji o wirusie i szczepionce. Analiza piśmiennictwa dowodzi ponadto istnienia wyraźnej luki między wiedzą a praktyką – mimo generalnie pozytywnego nastawienia do szczepień, wskaźniki wyszczepialności przeciwko HPV wśród samych pracowników ochrony zdrowia i studentów kierunków medycznych pozostają na niskim poziomie. Wskazuje to na potrzebę wdrożenia systematycznych i ukierunkowanych interwencji edukacyjnych dla grup zawodów medycznych (lekarze, pielęgniarki, położne) i wśród studentów tych zawodów, co jest kluczowe dla poprawy jakości poradnictwa i zwiększenia akceptacji szczepień w społeczeństwie.

Słowa kluczowe: HPV, personel medyczny, wiedza, postawy, szczepienia.

Introduction

The Human Papillomavirus (HPV) is a small, non-enveloped, double-stranded DNA virus belonging to the *Papillomaviridae* family. It is recognized as one of the most common sexually transmitted infections worldwide, affecting up to 80% of sexually active individuals according to various estimates [1]. HPV infection occurs mainly through sexual contact (vaginal, anal, oral), as well as through direct skin-to-skin contact in the genital area, which means that condoms, while reducing the risk, do not provide full protection [2-4].

Most HPV infections, 70-90%, are asymptomatic and usually transient, resolving spontaneously within one to two years without medical intervention. However, about 10% of HPV cases, in which chronic infection occurs, constitute a clinical problem [5]. As various studies show, persistent infection with oncogenic HPV types, especially HPV 16 and 18, is the main cause of cervical cancer development, accounting for about 70% of its cases [6, 7]. It is estimated that globally, HPV is responsible for about 5% of all cancers [8], including cancer of the anus, vulva, vagina, penis, and head and neck region cancers [6, 9]. Cervical cancer is considered a serious public health problem, being the fourth most common cause of cancer-related death among women worldwide, and in developing countries, the burden of this disease is disproportionately high [10,11].

The key element of primary prevention of HPV-related cancers is vaccination, which (as shown by various studies and many years of observation) is safe and very effective [12]. HPV vaccines, such as the 2-valent (HPV types 16, 18), 4-valent (types 6, 11, 16, 18), or 9-valent (types 6, 11, 16, 18, 31, 33, 45, 52, and 58), have proven their high clinical value. Various studies demonstrate that HPV vaccination programs can significantly reduce the risk of developing precancerous lesions and cervical cancer itself [4]. Medical personnel (doctors, nurses, and midwives) play a very important role in the prevention strategy, as they are perceived by patients as the most credible and trusted source of health information [13, 14]. Counseling and recommendation from a healthcare professional are considered one of the strongest predictive factors influencing the acceptance and implementation of vaccinations by adult patients and parents of adolescents eligible for HPV vaccination [15, 16]. In light of the above, it is very important that medical personnel have current, reliable, and evidence-based knowledge regarding HPV epidemiology, its oncogenic potential, and the effectiveness and safety of vaccinations against this virus. This will allow for professional, evidence-based, and effective patient education, debunking various myths related to vaccinations in general and the HPV virus itself, dispelling various doubts, and promoting vaccination as a key tool in the fight against cancer [17-19].

The aim of this study is to present the current state of knowledge and attitudes of medical personnel and students of medical disciplines regarding human papillomavirus (HPV) infections and vaccinations, with a particular focus on identifying educational gaps and barriers affecting vaccination uptake within these professional groups.

Methods

The study utilized the method of critical literature analysis. A literature review was conducted using medical databases (including PubMed), covering publications released

between 2010 and 2025. The analysis included articles in Polish and English, comprising both original research and review papers, focusing on the assessment of knowledge, awareness, and attitudes of various healthcare professional groups (physicians, nurses, midwives) and students of medical disciplines regarding HPV prevention.

Knowledge level and attitudes towards HPV in light of international research

Physicians

Analysis of selected studies on physicians' knowledge about HPV and vaccinations against it reveals a heterogeneous picture, in which high general medical knowledge about HPV often contrasts with low vaccination rates – as some studies show, physicians generally demonstrate a higher level of general knowledge about HPV compared to other medical personnel groups, yet vaccination levels remain low. For example, a study conducted in Italy in 2017-2018 on a sample of healthcare workers found that being a physician, especially a family doctor or pediatrician, was a significant predictor of high scores on general HPV knowledge tests. The median score for general knowledge and attitudes was 69.2%, however – as the study authors emphasized – this knowledge was largely suboptimal. Factors favoring a higher level of knowledge about HPV among physicians included regular participation in courses and scientific congresses, and self-study of professional literature to obtain information about the vaccine [20]. Similarly, in a study from Shenzhen, China (2023) among hospital employees, physicians achieved the highest average knowledge scores (12.4 out of 15 points), significantly exceeding the knowledge level of staff from private hospitals, where the average was only 10.9 points. However – as the authors of this study emphasize – analyzing the results at a detailed level reveals significant knowledge gaps regarding HPV, i.e., only 52.2% of respondents were aware that natural HPV infection does not provide sufficient immunity to fight off subsequent infection, and less than 65% of participants knew that HPV can be transmitted through skin or mucous membrane contact and various bodily fluids (not just vaginal and penile secretions), and also that vaccination is available for men [21].

Particularly noteworthy is the fact that some studies clearly show a dissonance between knowledge and practice regarding HPV. A study from North Delhi, India (2025) showed that although 95.9% of physicians had knowledge of the HPV virus, only 11.67% of them were vaccinated. For comparison, in the same facility, only 66.7% of nurses and 73.4% of paramedical staff had HPV knowledge, which shows that even in the group with the highest HPV awareness (i.e., doctors), personal prevention (vaccination) is at an alarmingly

low level. Although 89.34% of physicians were convinced of the vaccine's safety, the low vaccination rate indicates the existence of certain barriers, such as the high cost of its acquisition or a lack of awareness of personal risk of infection and its potential consequences [22]. Another study from India (2016) also revealed significant differences in HPV knowledge among different medical professional groups – while 86% of gynecologists correctly knew the trade names of HPV vaccines, only 27% of other medical personnel possessed this knowledge [23]. In turn, particularly alarming data come from studies evaluating knowledge in narrower specializations and in different healthcare systems. For example, in Slovenia (2018), a surprisingly low level of HPV knowledge and trust in the vaccine was observed among a group of 34 gynecologists, which is alarming given the key role of these specialists in cervical cancer prevention. The study authors note, however, that due to the small research sample, these conclusions may not be representative of the entire population of Slovenian gynecologists, but they are still surprising and thought-provoking. In the same study, pediatricians and school doctors presented the highest knowledge, indicating that the level of HPV knowledge may be strongly correlated with direct involvement in implementing HPV vaccination programs [24]. This is also confirmed by results from Norway (2017), where general practitioners (GPs) had significantly lower HPV knowledge than nurses. However – as this study shows – only 47% of all respondents (N = 220) knew that HPV infection could be a cause of cervical cancer. It is also worth noting that the willingness to vaccinate their own 12-year-old daughter against HPV was declared by "only" 68% of GPs compared to 93% of nurses. As the study authors emphasized, these differences may result from different sources of information – nurses more often used materials from the Norwegian Institute of Public Health, whereas doctors used these sources much less frequently. Furthermore, importantly, 88% of nurses and 50% of GPs admitted that they also drew information about HPV from pharmaceutical industry materials (information leaflets, other) [25].

Nurses and midwives

Nurses, as the professional group with the most frequent and direct patient contact, play a very important role in health education and vaccination promotion. Their knowledge and attitudes often have a direct impact on patients' decisions regarding health maintenance and disease prevention; however, some scientific studies indicate that their substantive preparation regarding HPV knowledge is sometimes insufficient, which can be a significant barrier to effective prevention of sometimes very serious complications of infection with this virus.

For example, such conclusions come from Turkish studies. In one of them (2015, N = 464), the level of knowledge about HPV among the surveyed nurses and their willingness to be vaccinated was described as "very low," and none of the surveyed nurses had received the HPV vaccine, citing the main reasons as lack of sufficient HPV knowledge (57.3%) and the belief that the vaccine against this virus is not common (20.7%). Furthermore, almost half of the nurses surveyed (44%) stated they would not recommend the vaccine to patients due to a lack of sufficient knowledge about it [6].

Knowledge gaps often concern very specific, key aspects of virology. For example, in a study conducted in Israel (2023, N = 565), a high percentage of incorrect answers was noted among the surveyed nurses to the question regarding body areas that can be infected by the HPV virus – 60.5% of nurses provided incorrect answers [1, 26]. A study from the United Kingdom (2019, N = 643) also identified gaps in education regarding knowledge about the possible health consequences of HPV infection in men, and a significantly higher level of knowledge in answers to various HPV-related questions was possessed by nurses and midwives working in gynecological clinics where colposcopy examinations were performed, suggesting that the level of HPV knowledge may be linked to their specialization and daily professional practice [8]. In turn, in England (2017, N = 128), 62.8% of nurses incorrectly believed that every HPV infection requires pharmacological treatment, and 9.6% could not link the virus to cervical cancer [3]. Importantly, even when general HPV knowledge is high, it does not always translate into practice. In a Turkish study (2014), although an educational intervention (training) significantly raised the nurses' level of HPV knowledge (mean score from 13.9 to 31.3 points out of 37 possible), three months later, only two daughters of the nurses had been vaccinated against this virus. One of the reasons mentioned for the lack of willingness to vaccinate was the high cost of the vaccine [5]. Similar conclusions come from a study in China (2017), where 82.5% of surveyed nurses and nursing students were aware of the HPV vaccine's existence, yet 61.4% of them were reluctant toward this vaccination due to its high price [27]. A qualitative study from Peru (2021) additionally highlighted a communication problem in HPV vaccination – nurses and teachers were well-informed about the HPV virus and supported the vaccination program against it, but they noted that parents of adolescents lacked sufficient knowledge on the topic, which effectively hindered obtaining consent for this vaccination for their children [10].

Students of medical faculties

Educating future medical staff is an investment in the healthcare system, which is why the level of HPV knowledge gained by medicine and nursing students during their studies

is very important. Unfortunately, various studies indicate certain gaps in this area, which may affect their future professional practice and ability to effectively educate patients.

For example, in a study conducted in India (2025) among 313 nursing students (mean age 20.98 years, 81.2% female), about half of them were found to have only a moderate level of knowledge (52.4%) about HPV and, more worryingly, a negative attitude towards vaccination (50.1%). Furthermore, none of the participants in this study were vaccinated against HPV. Additionally, statistical analysis showed that female gender and a higher year of nursing studies (understandably) were predictive factors for having better HPV knowledge, while first-year students had less knowledge about the virus but simultaneously showed a more positive attitude towards vaccination [28]. In turn, in a study of Chinese nurses in postgraduate internships (2021, N = 323), the knowledge level was defined as low – only 9.7% of students knew that HPV infection is usually asymptomatic, only 20.5% were aware that the HPV vaccine does not cause serious side effects, and 59.3% believed that HPV infection occurs through sexual contact [4].

Also interesting is the fact that high theoretical knowledge, acquired during nursing studies, does not always go hand in hand with pro-health attitudes and behaviors. In a Turkish study (2018) involving 624 nursing students, a high level of knowledge on risk factors and HPV transmission routes was found – 90.5% knew that the virus could cause cervical cancer, and 94.6% correctly identified it as a sexually transmitted disease. However, despite the generally high level of HPV knowledge, 98.1% of the respondents were not vaccinated, which is a classic example of the knowledge-practice gap [7]. The situation is similar among medical students. In India (2017, N = 400, including 200 medical students), over 80% of students knew about the existence of the HPV vaccine, but only 5.5% of the respondents were vaccinated against this virus. Moreover, in the same group, over 90% of the study participants incorrectly believed that HPV could cause colon and lung cancer, and over half of the female medical students thought that cytology (Pap test) was the only available screening method, which indicates a lack of reliable information about methods and techniques for testing and detecting the virus in such an educated population [29]. In another study from India (2016), general awareness about the HPV vaccine among medical students was 54.5%, and the main source of information was academic education, which underscores the significant role of curricula in medical studies regarding reliable methods of HPV prevention and detection [30]. In turn, a study conducted in Iran (2019, N = 360 female medical students) showed that 56.4% of students had poor HPV knowledge. Furthermore, as stated in this work, an increase in the level of HPV know-

ledge increases the chances (acceptance) of getting vaccinated against HPV (each unit increase in the knowledge scale increased the likelihood of vaccine acceptance against this virus by 15%), which directly indicates that the level of knowledge about HPV and the potential consequences of its infection increases the probability of getting vaccinated against the virus [2].

Knowledge and attitudes towards HPV of Polish medical personnel

Analysis of studies conducted in Poland also provides detailed insight into the state of knowledge and attitudes of medical personnel in the country, unfortunately confirming the existence of educational gaps and barriers in the implementation of effective HPV prevention.

Physicians

Studies concerning Polish physicians indicate discrepancies between attitudes and practice regarding HPV prevention. In a study involving 300 gynecologists and general practitioners (GPs), although 83% of respondents declared informing patients about the HPV virus and vaccination against it, however – as the study authors noted – there was a dissonance between the declared positive attitude and the rare practice of actively recommending vaccinations. The physicians' personal beliefs and experiences proved key to their attitudes, i.e., recommendations for vaccinations in patients were significantly more frequent among physicians who vaccinated their own children ($p = 0.001$) and who themselves regularly vaccinated against influenza ($p = 0.01$). At the same time, their knowledge level was assessed as insufficient – only 42% of gynecologists and 57% of GPs considered their knowledge about the HPV virus to be sufficient. The main sources of information for them were scientific materials and the press (74% of gynecologists, 83% of GPs) and medical conferences (70% and 68%) [31].

The problem of insufficient knowledge about the HPV virus is particularly visible among doctors during specialization. A study aimed at analyzing the state of knowledge of 639 resident doctors (including gynecology, dermatology, and pediatrics) showed that their knowledge about HPV is low, and about the vaccine itself "very low." Importantly, this state was independent of gender, age, and chosen specialization. The study authors indicated that although knowledge influences attitudes towards vaccinations, it does not translate into undertaking proactive preventive actions [32].

Nurses

Similar knowledge deficits are identified in the group of Polish nurses, who play a key role in patient education. A study conducted from January to March 2024 on a sample of 215 nurses from the Upper Silesian-Zagłębie Metropolis showed that this professional group's knowledge about HPV vaccination and cervical cancer prevention is insufficient. An alarming fact is that the vast majority of the nurses surveyed were not vaccinated against HPV. It was observed, however, that younger nurses (aged 22-35) showed a higher level of HPV knowledge than their older colleagues (aged 46-65). These results emphasize the necessity of introducing HPV education at the university level and its continuous updating during professional activity [33].

Students of medical faculties

The knowledge and attitudes of students in medical fields are also crucial for prevention, including against the HPV virus, yet as studies show, there are gaps in this topic among the students themselves. An analysis conducted on a sample of 1061 medical students from Poznań showed a clear evolution of knowledge during their studies. Students in clinical years (4-6) had a significantly higher level of knowledge than students in preclinical years (1-3), especially regarding HPV-related cancers other than cervical cancer (e.g., awareness of the link with anal cancer increased from 48% to 83%). Despite this improvement in knowledge, the overall HPV vaccination rate in the study group was low, at only 24.4% [34]. Another comparative study showed that although medical students are much more aware of prevention than non-medical students (e.g., 86% vs 73% in the context of HPV as the main risk factor for cervical cancer), significant HPV knowledge gaps existed in both studied groups. For example, surprisingly, about half of the students surveyed incorrectly claimed that there is a link between the development of cervical cancer and genetic inheritance [35].

The problem of educating students in medical fields seems to be systemic. One study revealed the phenomenon of the so-called "academic bubble effect." Medical students, although they acquire theoretical knowledge in virology and pathogenesis well, simultaneously have a very low level of knowledge about the practical aspects of prevention, such as the functioning of the national vaccination program. As MA. Gryglewska et al. indicate, medical universities teach "what the HPV virus is," but fail in teaching how the healthcare system fights it and what the doctor's personal role is in it. This disparity makes the theoretical knowledge partially useless in the context of real patient counse-

ling, as future medical personnel must know not only the indications for vaccinations but also their schedule and reimbursement rules [36].

Summary

As various studies indicate, the level of knowledge about the Human Papillomavirus and vaccinations against it among medical personnel (doctors, nurses) and students of medical faculties is highly varied and, in many cases, insufficient [13, 20, 26]. Analysis of studies from different parts of the world, including Europe (Poland included), Asia, and Africa, reveals significant knowledge gaps regarding HPV that affect medical professionals themselves [1, 4, 26, 27]. These gaps concern both basic information, such as transmission routes and its asymptomatic course, as well as more detailed issues, including indications for vaccination, their schedule, and also their effectiveness and safety [3, 4, 21]. However, there are also studies documenting a high level of general HPV awareness, especially among physicians of specific specializations [20].

A particularly worrying phenomenon, repeatedly emphasized in studies, is the so-called "knowledge-practice gap" [7, 22]. Even in groups where the level of theoretical HPV knowledge is relatively high, it does not automatically translate into positive attitudes and pro-health behaviors, such as getting vaccinated against this virus [7, 22, 29]. The low HPV vaccination rate among medical personnel and medical students themselves constitutes a serious barrier, undermining their role as credible ambassadors of this form of prevention [1, 22, 29]. The main reasons for this state of affairs are financial barriers (high cost of the vaccine in some countries – lack of state reimbursement), concerns about its safety and effectiveness, and a lack of awareness of personal risk [5, 22].

The above conclusions prove that a key and urgent action, aimed at improving public health, should be the implementation of systemic, continuous, and targeted educational programs for medical personnel and medical students [19, 27, 37]. These interventions should be designed not only to impart theoretical knowledge but also to build trust in the scientific evidence regarding vaccinations and to dispel any doubts on this topic. Only by raising the competence of medical personnel will it be possi ble to effectively build public trust in vaccinations, which in the long term will translate into a real reduction in the burden of HPV-induced cancers [18, 19, 37].

Conclusions

Based on the conducted literature analysis, the following conclusions have been formulated:

The level of knowledge regarding the human papillomavirus (HPV) and protective vaccinations among medical personnel and students of medical disciplines is heterogeneous and often superficial, which may result in ineffective patient education.

A significant discrepancy is observed between theoretical knowledge and practical attitudes, as evidenced by the low percentage of vaccinated healthcare workers, despite their general acceptance of vaccinations.

There is an urgent need to modify educational curricula and introduce regular postgraduate training that places greater emphasis on the practical aspects of prevention and the development of communication skills necessary for promoting HPV vaccination.

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