

REVIEW DERLEME

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# Pharmacists' Roles in Human Papillomavirus (HPV) Vaccination: A Traditional Review

## Eczacıların İnsan Papilloma Virüsü (HPV) Aşılamaındaki Rollerini: Geleneksel Derleme

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**ABSTRACT** Human papillomavirus (HPV) is recognised as the most prevalent sexually transmitted infection, causing malignancies. Global HPV vaccination coverage among women aged 9–45 remains at 39.7%, with significant disparities across income levels. Pharmacists play a pivotal role in mitigating its impact through proactive vaccination advocacy, patient education, and the rigorous oversight of immunisation programmes. The aim of this study is to examine pharmacists' impact and effectiveness in managing and promoting HPV vaccination, as well as to emphasize their crucial function in boosting vaccination rates and awareness. A comprehensive literature review was conducted using databases such as PubMed®, Science Direct®, Google Scholar® and Web of Science® to gather relevant information. The review includes studies that examined pharmacists' involvement in HPV vaccination programs and their results. The findings show that pharmacists make a major contribution to increased vaccination rates through educational activities, patient counselling, and active supervision of vaccination programs. Pharmacists often serve as the most accessible healthcare professionals, and their engagement can help to reduce vaccine reluctance, promote adherence to vaccination schedules, and assure effective vaccine delivery. Their engagement increases vaccination rates and awareness, which contributes to the overall decrease of HPV-related diseases. In conclusion, pharmacists play a significant part in vaccination against HPV. Their active engagement in vaccination programs, patient education, and community outreach is critical to increasing vaccination rates and lowering the prevalence of HPV-related diseases. Increased integration of pharmacists into healthcare efforts has the potential to greatly increase the success of HPV vaccination programs and, ultimately, public health outcomes.

**Keywords:** Human papillomavirus; pharmacist; vaccination; community pharmacy; attitude and behaviour

**ÖZET** İnsan papilloma virüsü [(Human papillomavirus (HPV))], dünyanın en yaygın cinsel yolla bulaşan enfeksiyonlarından olup birçok maligniteyle ilişkilidir. Kadınlar arasında 9–45 yaş aralığında küresel HPV aşılama oranı %39,7 seviyesindedir ve gelir düzeyine göre büyük farklılıklar göstermektedir. Eczacılar, hasta eğitimi ve aşılama programlarında sunabileceği hizmetler aracılığıyla HPV'nin etkilerini azaltmada kritik bir rol oynamaktadır. Bu çalışmanın amacı, eczacıların HPV aşılama sürecini yönetme ve teşvik etme konusundaki etkisini ve etkinliğini incelemek, aşı oranlarını ve farkındalığını artırmadaki kritik rollerini vurgulamaktır. İlgili verileri toplamak için PubMed®, Science Direct®, Google Scholar® ve Web of Science® gibi veri tabanları kullanılarak kapsamlı bir literatür taraması yapılmıştır. Bu derleme, eczacıların HPV aşılama programlarına katılımını ve sonuçlarını inceleyen çalışmaları içermektedir. Bulgular, eczacıların eğitim faaliyetleri, hasta danışmanlığı ve aşılama programlarının aktif denetimi yoluyla aşılama oranlarının artmasına önemli katkı sağladığını göstermektedir. Eczacılar genellikle en erişilebilir sağlık profesyonelleridir ve katılımları aşı tereddüdünü azaltmaya, aşılama takvimlerine uyumu teşvik etmeye ve etkili aşı teslimatını sağlamaya yardımcı olabilir. Katılımları, aşılama oranlarının ve farkındalığının artmasına katkıda bulunarak HPV ile ilişkili hastalıkların genel olarak azalmasına yardımcı olur. Sonuç olarak, eczacılar HPV'ye karşı aşılama konusunda önemli bir rol oynamaktadır. Aşılama programlarına, hasta eğitime ve topluma ulaşmaya aktif katılımları, aşılama oranlarının artırılması ve HPV ile ilişkili hastalıkların yaygınlığının azaltılması için kritiktir. Eczacıların sağlık hizmetleri çabalarına daha fazla entegrasyonu, HPV aşı programlarının başarısını ve nihayetinde halk sağlığı sonuçlarını büyük ölçüde artırma potansiyeline sahiptir.

**Anahtar Kelimeler:** İnsan papilloma virüsü; eczacı; aşılama; toplum eczanesi; tutum ve davranışlar

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Human papillomaviruses (HPV) are a group of deoxyribonucleic acid viruses primarily transmitted through sexual contact.<sup>1</sup> Among them, HPV16 and HPV18 are the most oncogenic types, classified as type 1 carcinogens by the International Agency for Research on Cancer.<sup>2</sup> Globally, HPV infection is the most prevalent sexually transmitted infection, affecting skin, genital tracts, and throat with varying clinical impacts. According to Bruni et al, approximately 12% of adult women worldwide are infected with HPV, with higher rates in Sub-Saharan Africa (24%), Latin America and the Caribbean (16%), Eastern Europe, and Southeast Asia (14% each).<sup>3</sup> HPV acquisition peaks around age 20 in females, with about 80% exposed by age 50.<sup>3</sup> Risk factors such as human immunodeficiency virus positivity, history of maltreatment, or homosexuality increase HPV incidence. The World Health Organization projected that cervical cancer would constitute 91% of all HPV-related malignancies in women globally by 2018. A safe and effective vaccine is available to protect against HPV-related cancers and infections.<sup>4</sup> These vaccines target high-risk HPV types, preventing premalignant lesions and malignancies, ideally administered before sexual activity begins. HPV is the most prevalent sexually transmitted infection globally, associated with various malignancies. Despite its significance, global HPV vaccination coverage among women aged 9-45 remains at 39.7%, with notable disparities across income levels. In the United States, only 48% of adolescents aged 13-15 completed the vaccination series in 2018, falling short of the Healthy People 2030 goal of 80%. Pharmacists play a crucial role in addressing these gaps through proactive vaccination advocacy, patient education, and diligent oversight of immunisation programmes.<sup>5</sup>

Substantial public health burden and healthcare expenditures linked to HPV, it is evident that an effective response requires a comprehensive, multidisciplinary approach. This strategy must actively integrate pharmacists as key members of the healthcare team to promote prevention, early detection, and robust management measures, thereby safeguarding public health and improving patient outcomes. Pharmacists are widely recognised as trusted healthcare professionals who function as primary points of contact for many patients, thereby occupying a central

role in public health initiatives. Their contributions to immunisation efforts extend beyond the mere administration of vaccines; they utilise specialised expertise in vaccine handling-including administration, storage, and adverse effect management-to ensure that immunisation programmes are both safe and effective. This specialised knowledge, coupled with their high accessibility, positions pharmacists as optimal advocates for the promotion of vaccination behaviour and the correction of widespread misinformation.<sup>5,6</sup>

In urban and metropolitan settings, pharmacists are particularly well placed to mitigate logistical barriers to vaccination through extended operating hours and reduced associated costs. Their provision of personalised counselling serves to alleviate concerns regarding vaccine safety and efficacy, thereby diminishing vaccine hesitancy. Moreover, by disseminating precise and timely information about vaccine-preventable diseases such as HPV, pharmacists enable patients to make well-informed decisions regarding their health.<sup>7,8</sup> In summary, the multifaceted contributions of pharmacists-from the direct administration of vaccines to comprehensive patient education-are instrumental in addressing vaccination challenges, enhancing immunisation rates, and ultimately advancing public health outcomes.

This study aims to comprehensively review existing literature on pharmacists' impact and effectiveness in HPV vaccination and highlighting their crucial role in increasing vaccination rates and awareness.

## MATERIAL AND METHODS

In this study, which was conducted as a literature review, English, and Turkish studies from January 1<sup>st</sup> 2018 to May 1<sup>st</sup> 2023 were included. During this literature search, studies were searched with the keywords "Human Papilloma Virus (HPV)", "HPV vaccine", "HPV vaccine perceptions", "HPV vaccine implementation", "pharmaceutical care", "community pharmacy" in Pubmed®, Scopus®, Web of Science®, and Google Scholar® databases. The final screening took place on May 1<sup>st</sup>, 2023. The review included prospective and cross-sectional questionnaires, pilot studies, developmental formative evaluations, and prospective pre- and post-evaluations.

## RESULTS

In this review, 20 studies published between 2018 and 2023 were analysed to examine pharmacists' roles in HPV vaccination from various thematic angles (Table 1). These studies employed diverse designs, including 15 cross-sectional studies (some with mixed-methods approaches), 2 prospective studies, 1 developmental formative evaluation, and 2 pilot studies.

Several studies highlighted critical gaps in knowledge and awareness among pharmacists, pharmacy students, and the public.<sup>9-28</sup> Misconceptions about the safety, efficacy, and recommended age of HPV vaccination were commonly reported, especially in cross-sectional surveys involving both healthcare providers and guardians. Educational background and prior training significantly influenced pharmacists' willingness to recommend or administer the vaccine. Notably, studies with pharmacy student populations consistently reported a moderate baseline understanding of HPV transmission and vaccination, with attitudinal barriers shaped by cultural or social factors.

A significant proportion of the included studies evaluated intervention strategies aimed at improving pharmacists' engagement in HPV vaccination programmes.<sup>5,9-11,13-28</sup> Most interventions were based on educational activities and structured training-either face-to-face or via digital platforms. Several studies described the implementation of targeted educational campaigns, virtual seminars, and one-on-one patient consultations conducted within community pharmacy settings. Some interventions also included collaboration with broader healthcare teams and use of visual aids or informational brochures to improve communication. Sample sizes across these studies varied, ranging from small cohorts of 27 pharmacists or 34 parents/guardians to large-scale surveys involving over 1,200 participants, including pharmacists, general practitioners, and parents.

Importantly, studies reporting quantitative outcomes showed that pharmacist-led interventions contributed meaningfully to increased HPV vaccination rates. For instance, certain pilot studies and prospective interventions demonstrated improvements of up

to 24% in vaccine series completion rates among adolescents and increased parental intent to vaccinate following pharmacist-led education sessions. Some studies also reported enhanced confidence and motivation among pharmacists to initiate vaccine-related conversations with patients, thereby expanding their public health impact. Despite persistent barriers-such as cost concerns and low demand-these findings collectively suggest that pharmacist-driven strategies can measurably improve HPV vaccine uptake and awareness across varied population groups.

## DISCUSSION

HPV is one of the most common sexually transmitted infection globally, and its related cancers are uniquely preventable through effective vaccines. However, barriers such as insufficient knowledge, low awareness, poor vaccination demand, and high costs hinder vaccine uptake. Pharmacists, given their accessibility and trusted role in the community, can help overcome these challenges by offering patient education, counselling, and vaccination services directly in pharmacies. A proactive approach not only improves public understanding and attitudes toward HPV vaccination but also increases vaccination rates, thereby reducing HPV incidence and associated cancer cases, ultimately leading to better public health outcomes and lower healthcare costs.

### KNOWLEDGE ABOUT HPV VACCINATIONS

Dahes et al. revealed that there are significant gaps in understanding on HPV among pharmacists and pharmacy students, particularly regarding HPV genotypes, associated malignancies, and vaccination indications.<sup>9</sup> Despite this, 62% of students and 85% of pharmacists perceived their vaccination knowledge as good. Both groups expressed belief in the favourable benefit-risk ratio of HPV vaccination, but raised concerns over reported adverse effects affecting vaccination. However, more than half of students felt inadequately prepared to provide counselling on HPV vaccination and sexual health.<sup>9</sup> Similarly, Du-four et al., highlighted significant gaps in HPV and vaccine knowledge among French pharmacists, with only 21.4% demonstrating high awareness of HPV and 8.4% of its vaccine.<sup>10</sup>

TABLE 1: Summary of studies included

Study	Type of study	Follow up	Study population	Type of intervention	Results
Dahes et al. <sup>9</sup>	Prospective	3 months	220 pharmacy student and 55 community pharmacists	Volunteer-based online questionnaire	Pharmacists and student pharmacists' knowledge and skills must be improved.
Dufour et al. <sup>10</sup>	Cross-sectional, quantitative and descriptive survey intervention	8 months	195 pharmacists, 9 pharmacy assistant, 11 students	46-item online questionnaire	Pharmacists are interested in the role of vaccine promoter, but facilitators in this area is needed.
Julia et al. <sup>11</sup>	Cross-sectional	6 months	200 general practitioners, 201 community pharmacists, 800 parents	A qualitative phase with semi-structured discussion guide and a quantitative phase with online survey	Training community pharmacists increases the parents and physicians' acceptance of pharmacists as vaccine providers.
Mhrete et al. <sup>5</sup>	Cross-sectional	15 months	366 high school female students and 466 primary school female students	Face-to-face interviewer-administered questionnaire	Low knowledge and acceptability of the HPV vaccine among students. Vaccine promotion must be strengthened.
Frieze et al. <sup>13</sup>	Cross-sectional	-	61 adults between the ages 18-65 residing in Texas, U.S.	91-item online questionnaire	Factors affecting HPV vaccine uptake and acceptance may vary across different communities.
Adegbayega et al. <sup>14</sup>	Mixed-method, convergent	7 months	38 Black participants aged 18-45	Semi-structured interviews and 40-item online questionnaire	Lack of knowledge and recommendations are important factors contributing to low vaccine uptake among black young adults.
Maples et al. <sup>15</sup>	-	7 months	233 pharmacists, 70 family medicine and OB/GYN providers	Face to face interviews in pharmacies and online survey	Coordination between vaccine providers is useful in increasing vaccination rates and overcoming barriers.
Rancic et al. <sup>16</sup>	Cross-sectional	5 months	615 parents	Semi-structured questionnaire	Age of children, gender, residence place, education, cost, and recommendation of the HPV vaccination are important factors for vaccine uptake.
Aksoy et al. <sup>17</sup>	Cross-sectional	-	144 students from faculties of medicine, dentistry and pharmacy enrolled.	Cross-sectional, 41-item online questionnaire	Female students' knowledge and awareness levels differ significantly from the levels of male students. There are considerable knowledge gaps that must be addressed and filled through educational programs.
Teeter et al. <sup>18</sup>	Developmental formative evaluation	11 months	Pharmacy staff, primary care clinic staff, and parents of adolescent children	Interview	Collaborations between clinics and pharmacies boosts HPV vaccination rates, and appreciated by pharmacists, physicians and parents.
Koskan et al. <sup>19</sup>	Cross-sectional	-	27 pharmacists and pharmacy interns	Virtual conference, 40-item online questionnaire	Pharmacists perceived barriers to HPV vaccination include parental consent and stigma. Pharmacy-related barriers include a lack of a tracking and reminder system.
Daniel et al. <sup>20</sup>	Pilot study	8 months	VFC-eligible/enrolled male and female adolescents age 11-15 living in Clarke County, Alabama.	Feasibility study in pharmacy	Interprofessional collaborations are useful in accessing and implementing the HPV vaccination, especially in rural areas.
Ryan et al. <sup>21</sup>	-	1 month	11 rural pharmacists	Face to face interviews in pharmacies.	Rural pharmacists have the potential to be beneficial partners in HPV vaccination delivery, but there are obstacles, such as a lack of education and capacity.
Cebollero et al. <sup>22</sup>	Pilot study	5 months	All patients aged 18-26 years who attended the GHS adult family planning clinic	Education provided 3-phased pilot project. Hospital-based clinic intervention	Pharmacist-led interventions can increase the uptake of HPV vaccination among adolescents.
Askelson et al. <sup>23</sup>	-	5 weeks	175 federal funding program liaisons	Online questionnaire including 17 strategies	The most typically used interventions in HPV vaccinations centred on provider knowledge and patient education. Also, insurance coverage influences HPV vaccine decisions.
Islam et al. <sup>24</sup>	-	6 months	40 pharmacists	Semi-structured interview by telephone including 52 close-ended questions, and 24 open-ended questions	Although pharmacists mostly have a positive insights and advantages, they are mostly underutilized.
Fernandes et al. <sup>25</sup>	Cross-sectional	A period of semester	401 University of Ottawa female undergraduate students aged 18-25	Study-specific bilingual online questionnaire	The perspective on the HPV vaccination is mainly positive, however one of the most major barriers has been identified as cost.
Tolentino et al. <sup>26</sup>	Cross-sectional	1 month	240 community pharmacists	Anonymous 73-item online questionnaire	Improvements in HPV and its vaccine is needed, recommendations are inadequate.
Wick and Elswick <sup>27</sup>	Prospective	-	34 parents/guardians	17-item pre- and post-test educational sessions with parenting groups	Pharmacist delivered education is useful in increasing parental knowledge and awareness in HPV vaccination.
Shah et al. <sup>28</sup>	Cross-sectional	3 months	1500 parents of adolescents aged 11-17	Online questionnaire	Parents were more likely to obtain their children's HPV vaccine from pharmacists if they perceived higher benefits in pharmacies and appreciated patient accessibility more than the health care environment.

HPV: Human papillomavirus; OB/GYN: Obstetrics and gynaecology; VFC: Vaccinations for children; GHS: Gady health system



A Turkish study held by Aksoy et al. to assess medicine, dentistry, and pharmacy students' knowledge and perceptions regarding HPV and the HPV vaccine.<sup>17</sup> Their finding highlighted significant gender related differences in HPV awareness: 61% of men versus 79.6% of women had prior knowledge of HPV. Regarding HPV's impact on both genders, 72.8% of females and 61% of males recognized its potential effect, revealing notable gender-based disparities. More than half of respondents (51.4%) reported lacking knowledge about sexually transmitted diseases, and 75% had never received formal HPV education. Differences in vaccination knowledge also emerged by gender. Social media played a significant role in information dissemination, with 37.5% citing it as a primary source. Many students were unaware of key vaccination details, such as the number of doses required and optimal timing for pre-sexual activity.<sup>17</sup>

A cross sectional study conducted by Mihretie et al. evaluated female adolescent students' knowledge and acceptance of the HPV vaccination in Debre Dabor Town, Ethiopia.<sup>5</sup> Almost one-third of participants had no prior information about the HPV vaccination, despite the majority had heard of it and 59.2% of students knew about the HPV vaccination. Majority of the participants agreed that the HPV vaccination can prevent cervical cancer, and the HPV vaccination was effective.<sup>5</sup>

In a 2022 study in Serbia, parents' awareness of HPV infection and vaccination behaviour was investigated. The study surveyed parents of children aged 9 to 19 years and found that 78.0% correctly identified all modes of HPV transmission, while majority knew factors increasing cervical cancer risk. Despite overall high awareness, gaps existed in understanding clinical manifestations, at-risk groups, the number of doses needed, the duration of protection, and common side effects. Females were significantly more likely than males to receive the vaccine, possibly due to later recommendations for males.<sup>16</sup>

Frietze et al. conducted a cross-sectional study in El Paso, Texas, focusing on vaccination behaviours among Hispanic young adults.<sup>13</sup> The study explored cultural factors such as language, household size, relationships within the family, religion, and commu-

nity health stigma influencing HPV vaccine acceptance and uptake. Surveying predominantly Hispanic and female participants, the study found that perceived benefits, safety, and severity of HPV infection positively influenced vaccine acceptance, whereas perceived harm had a negative correlation. Surprisingly, HPV awareness did not significantly impact vaccine acceptance. Trust in government and health-care providers emerged as critical factors influencing both HPV vaccine acceptance and uptake. Participants were more likely to accept the HPV vaccine if Spanish was their primary language, they lived in larger households, or were actively engaged in religious organizations. However, higher levels of health-related community stigma were associated with lower HPV vaccine acceptance. Despite El Paso County's reputation for high HPV vaccination rates, over half of the respondents had not received the HPV vaccine.<sup>13</sup>

The black race is linked with a decreased possibility vaccine uptake rates Adegboyega et al. investigated beliefs, attitudes, and knowledge regarding HPV among youth.<sup>14</sup> Vaccination rates among black young adults (18-26 years old) were lower at 36.7% compared to 42.1% for white young adults. African American participants showed a better vaccination history than African immigrant participants. Understanding of HPV and the vaccine significantly correlated with vaccination status, influenced by factors like age, race, ethnicity, and awareness of the vaccine. HPV vaccine knowledge was substantially related to vaccination. Despite 80% awareness of HPV, over 70% were unaware of its high prevalence, and 90% did not know that HPV infections often resolve without treatment. Many participants underestimated their vulnerability to HPV.<sup>14</sup> Common barriers to HPV vaccination identified were unawareness, a lack of professional recommendation, expense, privacy concerns, and safety concerns, as well as an inadequate number of HPV vaccine recommendations from health care providers.<sup>14</sup>

It is well known that knowledge levels significantly impact disease prevention. Various studies have demonstrated a direct positive correlation between increased knowledge and vaccination behaviour.<sup>29,30</sup> Research conducted in different countries

and settings indicates that HPV knowledge levels are generally insufficient. Given their critical role in public health, pharmacists are in a unique position to implement interventions that enhance knowledge about HPV. We believe that these efforts by pharmacists will lead to improved management of HPV and its associated complications, ultimately contributing to better health outcomes.

## PHARMACIST ATTITUDES AND BEHAVIOUR REGARDING HPV VACCINATION

Dufour et al., assessed French pharmacists' attitudes towards HPV vaccination.<sup>10</sup> Pharmacists expressed strong support for HPV vaccination, emphasizing its safety and benefits, and viewed promoting the vaccine as a professional responsibility.<sup>10</sup> However, few had actively recommended it, due to missed opportunities and forgetfulness. A majority favoured pharmacy-based immunization campaigns but emphasized the need for resources such as training, computer alerts, and promotional materials like flyers.<sup>10</sup> Study by Ryan et al. evaluated the attitude of rural pharmacists in the HPV vaccine in Iowa.<sup>21</sup> Most pharmacists believed that HPV vaccination fit within their professional scope. They found aspects that facilitate vaccination delivery as well as barriers, such as a lack of knowledge, safety concerns, time limitations, and personnel capability. Despite numerous obstacles to HPV vaccination delivery and promotion, the majority of pharmacists were eager to overcome these obstacles. However, several pharmacists expressed a desire for further information and training on the vaccination and how to give it. Because of their interactions with adolescents and parents, pharmacists might not only provide HPV vaccines but also educate parents, distribute information, and refer patients to local health care specialists.<sup>21</sup> Islam et al. conducted a study that focused on pharmacists' insights into the barriers and facilitators of providing HPV vaccinations in community pharmacy settings.<sup>24</sup> Parental consent, patient follow ups and recall, stigmatization for HPV vaccination, and teaching about or promotion of vaccination were among the problems underlined by pharmacists.<sup>24</sup>

In 2023, a French study investigated the attitudes of general practitioners (GPs), parents, and commu-

nity pharmacists regarding the potential expansion of pharmacist roles in HPV vaccination. Pharmacists expressed optimism about expanding their role to improve vaccination coverage and improving the HPV follow ups. Parents generally supported pharmacist involvement, particularly if they trusted vaccination and understood HPV. However, they still viewed GPs as the primary authority for vaccination due to concerns about GP availability. Overall, while there was some parental support for pharmacist-led vaccination, many preferred scenarios where GPs remained involved as prescribers or vaccine providers.<sup>11</sup> Also, A developmental formative evaluation was conducted by Teeter et al. to investigate strategies to increase HPV vaccination rates and assessed pharmacy staff, clinic staff, and parent perceptions for increasing HPV vaccination series completion rates.<sup>18</sup> The majority preferred the shared-responsibility model, meaning an agreement between physician and pharmacist can be established so that the 1<sup>st</sup> dose of HPV vaccine is given in the clinic while the 2<sup>nd</sup> dose is provided in the pharmacy. Pharmacists expressed enthusiasm for raising awareness about HPV vaccination, educating parents, and promoting pharmacy-based immunization services. They demonstrated confidence in their ability to administer the vaccine but highlighted concerns about stigma linked to HPV vaccination and misconceptions about its association with sexual behaviour. Education and trust were identified as key barriers to vaccination, particularly with the HPV vaccine. Furthermore, the lack of a requirement for the HPV vaccine was perceived as a barrier by many physicians. All clinic staff interviewed reported an interest in cooperating with a pharmacy to administer additional HPV vaccinations. Physicians expressed their desire to be engaged in at least one aspect of the childrens' HPV vaccination process.<sup>18</sup> Another study investigated the availability of HPV vaccines in community pharmacies and family medicine/obstetrics-gynaecology practices. The findings indicate that the HPV vaccination is widely available in non-independent pharmacies in the Southern United States. Family medicine and obstetrics-gynaecology physicians stated they are willing to recommend patients for HPV vaccinations in a pharmacy environment; however, various barriers

have been observed that may limit this practice. The most common barriers expressed were the desire for patients to be vaccinated in their office, concerns that patients would not complete the HPV vaccine series if referred outside their practice for vaccination, providers not knowing or having documentation of vaccination if carried out in a pharmacy setting, and potential financial difficulties for patients due to a lack of insurance coverage for the HPV vaccine in a pharmacy environment.<sup>15</sup>

In 2018, a prospective pre-post study was conducted with parenting groups to assess parental perceptions of the HPV vaccine and its implementation in community pharmacies. Following the intervention, the intention to vaccinate increased from 35% to 44%. The percentage of participants who refused vaccination fell from 23% to 12%. Participants raised their awareness of HPV vaccination availability in community pharmacies from 32% to 100%.<sup>27</sup> The Adolescent Vaccinations in Pharmacies study surveyed parents to understand their preferences for HPV vaccination delivery settings. Safety, privacy, and convenience were identified as key considerations. Parents who valued the healthcare environment tended to prefer doctors' offices for vaccinations. Familiarity with pharmacists and prior vaccination experiences influenced parents' willingness to choose for pharmacy-based HPV vaccinations. Enhancing communication skills and emphasizing pharmacy advantages, such as convenience and accessibility, could increase parental trust in pharmacy-based HPV vaccinations.<sup>28</sup> Also previously mentioned study by Rancic et al., investigated awareness among parents.<sup>16</sup> In general, parents had a strong understanding of HPV infection and the HPV vaccination. However, an observation was made in the absence of parental awareness. Health insurance coverage for HPV vaccination among children aged 9 to 19 significantly increased parental acceptance. Factors positively influencing parental decisions included younger age of children, female gender, urban residence, parental medical education, paediatrician recommendation, and health insurance coverage. Concerns centred around vaccine safety, adverse effects, and long-term protection post-vaccination.<sup>16</sup>

Fernandes et al. conducted a cross-sectional study to assess the acceptability of HPV vaccination among undergraduate university women under the age of 25.<sup>25</sup> Comparing vaccination and non-vaccinated individuals. Vaccinated respondents held more favourable opinion towards the vaccination compared to non-vaccinated respondents. About half of non-vaccinated respondents expressed interest in future vaccination. Common barriers included lack of knowledge about the HPV vaccine and concerns about its adverse effects. Cost was a significant barrier in over half of the non-vaccinated group. Despite the desire to get vaccinated in the future, financial accessibility of the vaccine series often postponed immediate vaccination.<sup>25</sup>

A study held with participation of Utah pharmacists indicated that pharmacists with training and additional technician support demonstrated higher knowledge and positive attitudes toward HPV and its vaccine.<sup>26</sup> Female pharmacists were more inclined than males to recommend the HPV vaccine. Major barriers perceived included parental lack of understanding, concerns, or opposition, and insufficient educational resources for parents. Pharmacists highlighted the need for enhanced educational tools for patients, prescribers, and themselves to bolster vaccination efforts.<sup>26</sup> Koskan et al. conducted a survey in Arizona to assess pharmacists' behaviours regarding HPV vaccination.<sup>19</sup> Results showed that 81.5% of participants regularly administered vaccines, with 59.3% having administered the HPV vaccine previously. Intentions to vaccinate, perceived norms among peers, and behavioural control significantly influenced pharmacists' HPV vaccination behaviours. Barriers cited included parental reluctance, societal stigma towards the HPV vaccine, lack of insurance coverage, and challenges related to vaccine completion. Pharmacists identified educating parents as a key strategy to increase HPV immunization rates. Additionally, 74.1% highlighted the need for reminder systems to encourage patients to return for subsequent doses. Despite these insights, many pharmacists reported low HPV vaccination rates due to various challenges, including patient preferences for vaccination locations and pharmacy-related barriers, such as the absence of a reminder mechanism to mo-

tivate patients and caregivers to return to the pharmacy for further vaccine doses.<sup>19</sup>

A pilot study in rural Alabama aimed to boost HPV vaccination rates by designating a community pharmacy as a vaccinations for children provider. This initiative targeted barriers like access to care, cost, convenience, and the need for strong vaccine recommendations. By offering vaccinations at the pharmacy, accessibility improved for adolescents who lacked local specialized healthcare. The intervention increased HPV vaccine coverage from 27% to 34.4% among 11 to 13-year-olds. Patients' familiarity with the pharmacy and its staff played a crucial role in its success. The pharmacy benefited by eliminating the need for appointments, ensuring quick administration, and enhancing community engagement and support. Local physicians and the health department responded positively, referring patients for vaccinations.<sup>20</sup> In a pharmacist-led pilot study similar to Daniel et al., pharmacists initiated the stock of nonvalent vaccines and educated healthcare providers through sessions on HPV prevention, vaccination recommendations, and dosing schedules.<sup>20</sup>

One pharmacist was present daily at an Adult Family Planning Clinic, scanning schedules to identify eligible patients aged 18-26, verifying immunization status, providing patient education, delivering vaccines, and assisting with verification. Post-intervention, the durability of pharmacist-led interventions and education was evaluated, resulting in workflow changes and increased initiation of non-valent vaccination among the target demographic. During the study, 89 young adults received their 1<sup>st</sup> dose, with 20 receiving a 2<sup>nd</sup> dose, totalling 166 doses administered.<sup>22</sup>

Askelson et al. conducted a survey to explore vaccine-related quality improvement (QI) strategies in rural clinics that offer vaccinations.<sup>23</sup> Insurance companies were recognized as influential in decision-making. The most commonly implemented QI interventions focused on improving provider knowledge and patient education, which have been effective in increasing immunization coverage, especially among younger adolescents.<sup>23</sup> Barriers for HPV vaccination behaviour has been summarized at Figure 1.

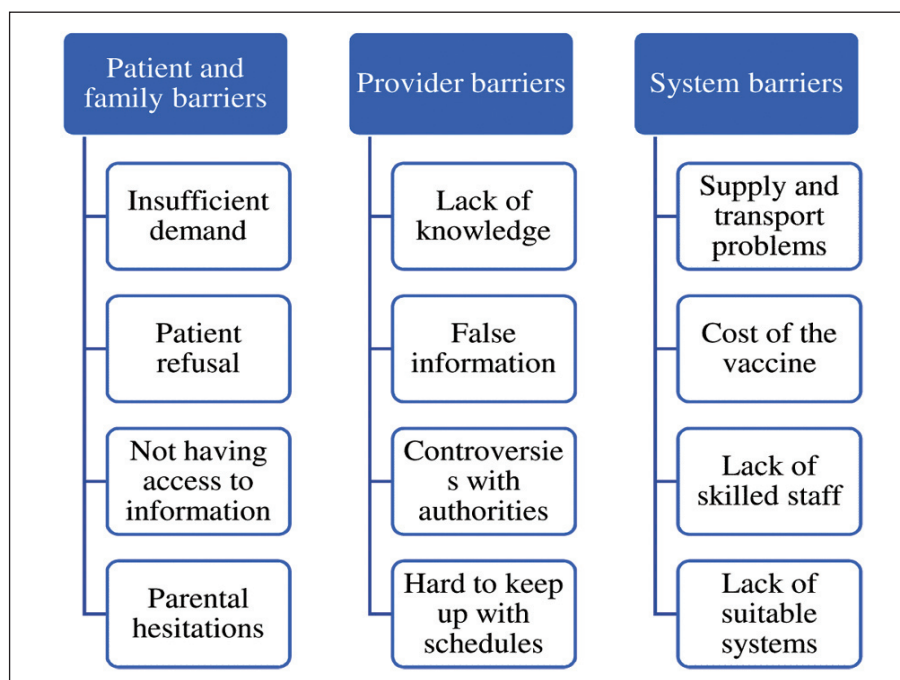


FIGURE 1: Barriers for HPV vaccination behaviour<sup>23</sup>



## PHARMACISTS' APPROACHES TO OVERCOMING COMMON BARRIERS IN HPV VACCINATION IMPLEMENTATION

Factors influencing individuals' HPV vaccination attitude include the following barriers frequently cited in the literature: stigmatization, misconceptions linking HPV vaccination to sexual behaviour, expectation of physician involvement in the HPV vaccination process, financial status and reimbursement issues, doctors accepting pharmacist involvement in HPV vaccination processes, difficulties of vaccination in community pharmacy settings, losing follow-ups for HPV vaccination boosters, adverse effects, postponing vaccination for various reasons, urbanization, cultural factors, nationality, and trust issues with governments and the pharmaceutical industry.

On the other hand, enhancers of HPV vaccination acceptance include pharmacist involvement decreasing vaccination hesitancy, communication skills,

community pharmacy convenience and accessibility, potential to reduce parental hesitancy, and pharmacist solutions for reimbursement and expenses. Implementing these enhancers into the pharmaceutical care process by pharmacists will be crucial in preventing HPV and its related complications.

Considering these barriers and enhancers in campaigns designed to increase HPV vaccination acceptance by community pharmacists and healthcare administrators would play an important role in enhancing the likelihood of success. Case-finding strategies for identifying patients who will benefit from a patient education regarding HPV-related cancer prevention can be utilized, which are given in Table 2.

Pharmacist proactive strategies, such as systematic immunisation status assessments and evidence-based structured communication frameworks, significantly enhance pharmacist-patient engagement and are directly associated with increased HPV vaccination rates. Proactive strategies, such as routine immunization status inquiries and structured conversation starters, enhance pharmacist-patient interactions and support vaccination goals, as shown in Table 3.

According to the findings of this review, several practical recommendations can be made to support pharmacists in overcoming common barriers to HPV vaccination. These include providing targeted continuing education programmes focused on HPV

**TABLE 2:** Case-finding tips for HPV-related cancer prevention<sup>8</sup>

Oral contraceptives
Other methods of contraception (e.g., condoms)
Travel medications or vaccinations
Prescriptions for children (can inquire about school vaccinations, both initial, 2 <sup>nd</sup> , or 3 <sup>rd</sup> doses)
Other vaccinations: Influenza, COVID-19
Any other preventive therapy (e.g., antihypertensives, statins)

HPV: Human papillomavirus; COVID-19: Coronavirus disease-2019

**TABLE 3:** Conversation starters for HPV-related cancer prevention<sup>8</sup>

Condition	Conversation starter
All patients	"As part of the full scope of care that I provide to all of my patients, I always ask about the prevention of illnesses." <sup>8</sup>
Patient using contraceptives	"Just to be thorough, I know your family physician does regular Pap Smears, but have they discussed HPV and cancer risks with you?" <sup>8</sup>
Patient receiving an antihypertensive or statin	"It's great that you are taking steps to prevent heart diseases or strokes. We should also talk about the prevention of the other big one, cancer." <sup>8</sup>
Patient receiving a vaccination for influenza, travel, or COVID-19	"These days, we all know how deadly viruses can be. Let's talk about some other viruses, like HPV." <sup>8</sup>
Filling out a prescription for a child	"Did you know that due to COVID-19, many schools have stopped routine vaccination programs? Let's discuss the vaccination status of (child's name). I don't want anyone falling through the cracks." <sup>8</sup>

HPV: Human papillomavirus; COVID-19: Coronavirus disease-2019

and its associated cancers, integrating reminder systems for follow-up doses, collaborating with local healthcare providers through shared-responsibility models, and ensuring that pharmacists are equipped with culturally sensitive communication strategies to address patient concerns. Expanding pharmacists' authority to administer HPV vaccines and ensuring reimbursement pathways can also improve accessibility, particularly in underserved communities.

This review also has limitations inherent to its design. As a traditional review, it does not follow systematic review methodologies such as Preferred Reporting Items for Systematic Reviews and Meta-Analyses, and therefore may be subject to selection and publication bias. In addition, the included studies exhibited notable heterogeneity in terms of design, population characteristics, interventions, and outcome measures, which limits the generalisability of the findings. Despite these limitations, this review provides a broad and contextually rich overview of the pharmacists' role in HPV vaccination and offers insight into areas where strategic pharmacist engagement may lead to meaningful improvements in vaccination rates.

## CONCLUSION

This review identifies several key domains in which pharmacists have demonstrated significant impact on HPV vaccination. First, pharmacists enhance vaccination rates in community settings through their primary preventive efforts and ready accessibility. Second, they improve public awareness and knowledge about HPV and its vaccine, thereby addressing misconceptions and bridging gaps in health literacy. Third, pharmacist-led educational campaigns and patient counselling have proven effective in reaching underserved populations and ethnic minorities, groups that traditionally exhibit lower vaccination rates despite higher infection risks. Fourth, in rural areas where HPV-related malignancies are more prevalent, collaborative initiatives between pharmacists and local healthcare providers have markedly improved vaccine access and uptake.

Based on these findings, it is recommended that systemic and legislative barriers to pharmacy-based vaccination be addressed to fully harness the potential of this accessible healthcare resource. Targeted educational initiatives should be implemented to further elevate public knowledge, particularly among high-risk and underserved communities. Moreover, fostering interprofessional collaborations between pharmacists, physicians, and public health authorities is essential to develop cohesive vaccination strategies. Such integrative efforts promise to further enhance HPV vaccination coverage, ultimately contributing to a reduction in HPV-related cancers and improved public health outcomes.

To ensure sustained progress, policymakers and public health authorities are urged to formally recognise pharmacists as integral providers in national immunisation strategies. This should include expanding pharmacists' scope of practice where necessary, establishing reimbursement models that support pharmacy-based vaccination services, and integrating pharmacists into public health outreach and surveillance systems. Furthermore, investment in policy frameworks that reduce vaccine hesitancy and promote equitable access to HPV vaccination across all demographic groups will be essential to closing persistent coverage gaps and achieving long-term cancer prevention goals.

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*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### Authorship Contributions

**Idea/Concept:** Rukiye Beyzanur Özşahin; **Design:** Rukiye Beyzanur Özşahin, Muhammed Yunus Bektay; **Control/Supervision:**

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