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Implementation of Pharmacy-Based Vaccination against Human Papillomavirus: A scoping review of literature

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Abstract

In most EU countries, pharmacists as community-based health care professionals (HCPs) can provide education and vaccination services, which can enhance convenience and accessibility for patients. This is especially important in areas where vaccine-coverage rates (VCRs) are suboptimal and in underserved areas where access to HCPs may be limited.

The aim of this review is to describe the impact and feasibility of human papillomavirus (HPV)-related pharmacy-based vaccination (PBV) programs. The findings indicate that expanding access to vaccinations through pharmacies has the potential to improve immunization rates, particularly in underserved or hard-to-reach populations. Pharmacists' roles as advocates, educators, and vaccine providers can address barriers, improve awareness, and promote vaccination uptake. Collaboration with other HCPs is essential for enabling a comprehensive approach to HPV vaccination promotion.

In conclusion, PBV programs have the potential to serve as an effective strategy for improving immunization rates in both rural and urban areas. The integration of pharmacies, through multi-disciplinary approach into HPV immunization programs can expand access, spread awareness, provide education, clarify concerns, increase convenience, and reach underserved populations. However, careful planning, training, and collaboration with other HCPs such as physicians and nurses, are necessary to overcome challenges and ensure the safe and efficient delivery of vaccines through pharmacies.

Key words: pharmacy, HPV, vaccination, public health, urban, rural

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Introduction

Pharmacy-based vaccination (PBV) programs have been found to increase convenience and access to vaccines, reducing barriers such as distance to available healthcare and transportation. Furthermore, these programs provide an opportunity for pharmacists to play an active role in promoting immunization and counseling patients on vaccine-related matters (1, 2).

According to the latest International Pharmaceutical Federation (FIP) report on leveraging pharmacies to enhance life-course vaccination, 14 countries have successfully implemented anti-human papillomavirus (HPV) PBV programs (1). Additionally, new entrants, including France, Greece, and Ireland, are emerging, where some pharmacists are authorized to prescribe and administer 9-valent vaccine, the current vaccine against HPV infection (1, 2).

Routine HPV immunizations are available through national immunization programs, reimbursement framework programs, or private clinics. These programs offer free vaccines for children and adolescents, typically aged 9 to 19, though this varies by country. Some countries provide subsidized vaccines for women and men. Adults over 19 can consult their healthcare providers about HPV vaccination benefits (3, 4).

Administered as an injection into a muscle, typically in the shoulder or thigh, the vaccine is available in vials or prefilled syringes as a suspension for injection. Side effects are generally mild to moderate, with common reactions including localized pain, redness, and swelling at the injection site, as well as fever, headache, fatigue, nausea, muscle pain, and fainting. While rare, fainting may occur post-HPV vaccination, prompting a recommendation for healthcare professionals to administer the vaccine with the recipient in a seated or lying position and to monitor them for 15 minutes to mitigate the risk of syncope and potential injury from falling. HPV vaccination is contraindicated in pregnant women, individuals with a history of life-threatening allergic reactions to any component of the HPV vaccine or previous doses, as well as those with allergic reactions to yeasts. Mildly symptomatic individuals, such as those with a cold, may receive the vaccine, but vaccination should be deferred for severely ill individuals until they have recovered (3–5).

HPV is primarily transmitted through sexual contact and can lead to HPV-associated cancers in both women and men. HPV infection is recognized as the cause of more than 90% of cervical and anal cancers, about 70% of vaginal and vulvar cancers and more than 60% of penile cancers (6, 7). According to available data, Serbia ranks fifth in the European region and second in the Balkan region for the incidence and mortality rates of cervical cancer (8). So far, community pharmacists in Serbia have played an important role in the project “Ask Me About HPV” promoting HPV vaccination and educating parents. This significant involvement began with the launch of this project by the Pharmaceutical Chamber of Serbia. The initiative aimed to increase HPV vaccination uptake in selected populations. The project has successfully created a pool of HPV-trained pharmacists who disseminate their knowledge across Serbia, particularly focusing on regions with higher incidence rates of HPV-related conditions, such as North Banat, West

Bačka, Zaječar, Bor, and Nišava. These pharmacists are well-equipped to answer patients' questions and contribute to developing individual HPV vaccination action plans, thereby enhancing public health efforts in the country.

Since the project's inception in February 2023, 250 pharmacists have been educated and trained to provide essential clinical information on HPV to adolescents and their parents or guardians. These pharmacists discuss the benefits of HPV vaccination and, after completing their training, receive a badge with the inscription saying "Vaccine Advisor – Ask me about HPV", which signals to the members of communities that they may proactively seek information from these pharmacists (9).

Cervical cancer is highly preventable through HPV vaccination and screening and many European countries joined strategic alliances through Europe's Beating Cancer Plan (7, 10–12).

The World Health Organization (WHO) has identified cervical cancer as a significant global threat and has launched the 90-70-90 strategy with the objective of reducing and ultimately eliminating cervical cancer. This strategy outlines achieving the following targets: 90% of 15 years old girls vaccinated, 70% of women screened for cervical cancer and 90% of women with cervical cancer receiving treatment.

This comprehensive strategy encompasses vaccination, screening, and treatment, with the overall goal of substantially reducing the incidence and mortality rates associated with cervical cancer. By targeting each stage of the disease continuum, the 90-70-90 strategy aims to have a significant impact on the global burden of cervical cancer (12).

Human papillomavirus, the most prevalent sexually transmitted virus worldwide, gives rise to a wide range of clinical manifestations, from benign conditions to different cancers in both men and women. Notably, cervical cancer is the most prevalent HPV-related cancer, with persistent HPV infection identified as a critical factor in over 99% of cases. The introduction of the 9-valent HPV vaccine has emerged as a highly effective strategy for preventing HPV-related cancers (13–15).

Aim

This review has been conducted with the following main objectives: (i) to assess recently published literature for implementation of PBV programs against the HPV-related illnesses and malignancies, and (ii) to identify the most important key performance indicators (KPIs) used to assess pharmacists' effectiveness in HPV-related PBV programs, as well as their drivers and barriers associated with utilizing pharmacies as vaccination sites.

Our hypothesis is that the impact of implementation of HPV-related PBV programs has been positive and may serve as an example for other countries to implement it as one of the key measures for improving the accessibility of immunization.

Our secondary hypothesis is that the published literature demonstrates benefits of HPV-related PBV programs in rural and underserved areas.

Methods

A scoping literature review (SLR) has been conducted to assess the literature published over the last 10 years, from January 2014 to July 2024, utilizing PubMed and Google Scholar databases and the following keywords: Pharmacy AND Vaccination and (Pharmacy-based vaccination) AND HPV. The scope of the SLR was determined based on the PICO (Population, Intervention, Comparator, Outcomes) framework (Table I).

The records included full publications and abstracts. A total of 18,300 records were identified from the databases. Four hundred forty-nine records were screened, and to comply with the designated ten-year timeline, 140 records were assessed for eligibility. A total of 101 studies were included in the review, as the criterion was to include only the studies describing anti-HPV PBV and those directly related to the aim of this review. We also reviewed professional organizations' statements and websites.

Table I PICO framework for scope of systematic literature review

Tabela I PICO okvir za opseg sistematskog pregleda literature

Category	Details
Population	Countries with implemented PBV programs offering HPV vaccines to children, adolescents and select adult population
Intervention	HPV vaccination is available through a nationally implemented program that includes pharmacists as part of the healthcare delivery team.
Comparator	No comparator
Outcomes	Number and geographical location of implemented PBV programs. Described positive impact on the implementation of the national anti-HPV immunization strategy

The selection is presented through the PRISMA 2020 (Preferred Reporting Items for Systematic reviews and Meta-Analyses) for reporting systematic reviews, and it is presented in Figure 1.

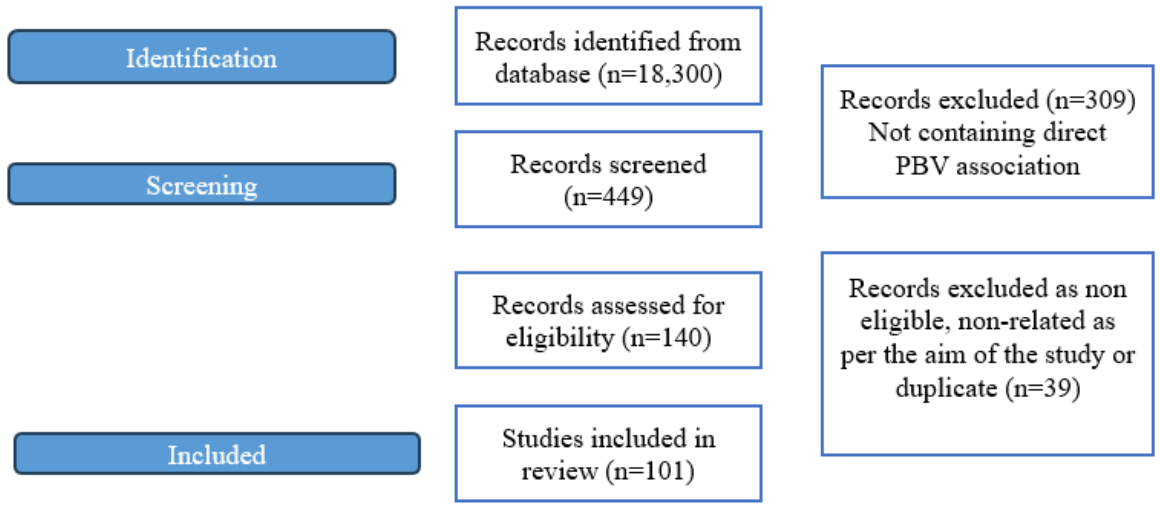

Figure 1. Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram of the screening and selection process

Slika 1. Dijagram toka preferiranih izveštajnih stavki za sistematske preglede i meta-analize (PRISMA) o procesu selekcije i pregleda

Results

As we performed analysis between 2014 and 2024, 79% (80/101) of the articles have been published in the last 5 years. The articles are predominantly written by the US-based authors, namely 71% (72/101) of the analyzed articles, with the rest of the articles, reports and abstracts coming from Canada, Latin America, Africa, and Europe.

Table II Geographical representation of the analyzed articles

Tabela II Geografska reprezentacija analiziranih članaka

Continent	Number of articles
Africa	2
Asia	3
Australia	1
Europe	4
North America	87
Country not specified	3

In this sample of the analyzed articles, 27% (27/101) of the articles address the need for effective PBV programs in rural areas.

Drivers and Barriers for Implementation of PBV Programs

Despite many benefits for implementation of PBV programs, challenges, however, exist in its implementation. These include ensuring the proper storage and handling of vaccines, maintaining cold chain integrity, maintaining accurate records, and training pharmacists to administer vaccines safely and effectively. Collaboration and coordination between pharmacies, healthcare providers, and immunization programs are vital for successful integration of PBV programs into the existing immunization efforts. This review, however, also identifies challenges that hinder the successful implementation of HPV vaccination programs (16–20). These challenges include limited resources, inequities in access to vaccination, vaccine hesitancy, lack of awareness, cultural and social factors, and healthcare system barriers. Additionally, some countries faced difficulties in sustaining high VCRs due to financial constraints or other logistical issues (21).

This review emphasized the importance of addressing these challenges through evidence-based strategies. These strategies include implementing comprehensive national vaccination plans, strengthening healthcare systems, improving education and awareness campaigns, addressing vaccine hesitancy, and working towards equitable access to vaccination services.

The key findings from this analysis highlight the most important KPIs used to assess pharmacists' effectiveness in HPV-related PBV programs, as well as their drivers and barriers.

Table III Some examples (not an exhaustive list) of drivers and barriers associated with key performance indicators (KPIs) described in the reviewed articles

Tabela III Neki primeri (lista nije iscrpna) faktora koji utiču na ključne pokazatelje performansi (KPP) opisane u pregledanim člancima

KPIs	Drivers	Barriers	References
Impact on adherence	Convenience	Pharmacies' lack of storage for vaccines and insurance-related barriers to care	Koskan A et al. 2022
	Existing infrastructure for vaccine delivery	Low engagement among pharmacy staff	Calo WA et al. 2019
	Coordination between family clinics and pharmacists	Administrative hurdles, i.e. lacking third party reimbursement	Doucette WR et al. 2019
	Ability to issue recalls and reminders		Rothholz M. 2019
Parental education as a key factor which impacts on adolescents' vaccination	Pharmacists have positive perceptions regarding the HPV vaccine.	Perceived parental concerns, parental awareness and education	Oyedeji O et al. 2021
	Increased VCR and decrease of vaccine hesitancy		Wick JA. 2018
	More opportunities for children to get health care		Calo et al. 2017
Rural and low socio-economic areas benefit from pharmacists' contribution in education and provision of professional advice impacting on equity in vaccine distribution and implementation	Accessibility	Personal and organizational barriers	Daniel CL et al. 2021
	Possibility for catch-up with other vaccines		Ryan G. 2019
	Increased access and equity		Vanderpool RC et al. 2019
	Interprofessional		Koskan AM et al. 2021
	Collaborative		
	Policy implementation for reduction in the incidence and mortality from HPV-related cancers		
	Provision of print health education resources and social media		

Spreading awareness amongst their communities	Improvement of HPV vaccination rates among adolescents	Education about HPV-vaccine is more time consuming due to stigma	Teeter BS et al. 2021 Teeter BS et al. 2020
Importance of delivery location	Preferences for educational modalities, avoiding stigmas associated with HPV vaccination, combating gender-focused biases, and preferences for the location of vaccination.	Opportunities for all pharmacists to promote and enhance vaccine uptake.	Cernasev A et al. 2024 Julia B et al. 2023
Stakeholder collaboration	Pharmacist-designed, educational interventions Multimodal and inter-professional approach The shared-responsibility model was the most preferred among parents.	Need for raising awareness about their immunization training and standardizing vaccination protocols that ensure coordination with primary care Parental awareness and education	Hohmeier KC et al. 2016 Shah PD et al. 2018 Teeter BS et al. 2021
Recording of vaccinations in national digital registries	Offering HPV vaccination sent patient reminders for vaccines with multiple doses. Utilizing telephone reminders, informing family doctors by fax and updating electronic record	The lack of a tracking and reminder system to encourage patients to return for additional HPV vaccine doses Parental consent, tracking and patient recall, perceived stigma of vaccination, and education about or promotion of vaccination	Koskan A et al. 2021 Lam JH et al. 2019 Islam JY et al. 2019

The KPIs in Table III have been selected from this SLR to describe drivers and barriers in PBV programs. A comprehensive list of identified drivers presents opportunities to propose their potential usefulness in overcoming recognized barriers. We have, therefore, identified a few opportunities for an easier implementation of each of the identified KPIs in practice.

Opportunities for Achieving KPIs by Mitigating Barriers with Identified Drivers

(i) Impact on Adherence; Lack of storage and insurance hurdles / Improvement of the infrastructure for vaccine delivery (i.e. recalls and reminders) (20, 24, 29, 33, 36, 39, 64).

(ii) Impact on the increase of VCRs in adolescents through parental education; Parental concerns, awareness, and education / More opportunities to access care and awareness through accessible community pharmacies (16–18, 22, 32, 33, 39, 44, 46, 51, 57, 110).

(iii) Rural and low socio-economic areas benefit from pharmacists' contribution in education and provision of professional advice impacting on equity in vaccine distribution and implementation; Personal, organizational and availability issues / In collaboration with other HCPs, provision of print health education resources and social media which may not be available (19–22, 24, 29–36, 38, 42–47, 59, 74, 77–86, 99–114).

(iv) Spreading awareness amongst their communities; Time consuming to due to the perceived stigma and vaccine hesitancy / Effective communication on the importance of anti-HPV prevention (18–22, 25, 31–33, 35, 40, 42, 65).

(v) Importance of delivery location; Not all pharmacists may have opportunities to promote and enhance vaccine uptake / Ensuring optimal cold-chain conditions, storage, and handling, reducing vaccines travel time from prescription to the end user (17, 24–26, 31, 35, 37, 40, 42, 44, 45, 68).

Based on the analysis of the above KPIs, we determined that both hypotheses are satisfied:

In both urban and rural areas, the impact of the implementation of PBV program initiatives has been overly positive and may serve as an example for other countries that lack such legislation. The PBV program has been demonstrated as one of the key measures for the improvement of immunization accessibility. Published literature to date demonstrates the benefits of HPV-related PBV programs in spreading awareness amongst the general population, including the parents of adolescents. They enhance adherence and provide additional access and regulated delivery locations, bring benefits to rural, low socio-economic and other underserved areas, facilitate stakeholder collaboration and ensure that immunizations are recorded and tracked.

Discussion

There are important requirements for a successful roll-out of PBV. A vaccine administration program requires a solid infrastructure of appropriately trained staff, physical space, and written policies and procedures to ensure appropriate vaccine storage and handling, patient screening and education, and documentation. The structure of a vaccine administration program must also provide for the storage and disposal of injection supplies, disposal of and prevention of exposure to biological hazards and emergency procedures (114).

In Table II, which included an analysis of key articles on the proposed KPIs, we can conclude that many drivers have been noted particularly in rural areas where an emphasis has been put on interprofessional collaboration and focus on eliminating disparity, advocating for the wider spread of such programs. There is evidence that pharmacists have positive perceptions regarding the HPV vaccine and are willing to provide vaccination services.

Pharmacies have the potential to play a significant role in increasing HPV vaccination rates, but there are several barriers that need to be addressed. Pilot projects in

five US states struggled to administer HPV vaccines due to low parent demand and engagement among pharmacy staff, as well as administrative hurdles such as lacking third-party reimbursement and limited integration into primary care systems. To increase support for HPV vaccination services in pharmacies, it is important to deploy policy measures aiming to expand third-party reimbursement to cover all vaccines administered by pharmacists, increase public awareness of pharmacists' immunization training, and improve care coordination with primary care providers, such as the general practitioners, pediatricians and nurses. Additionally, other important policy measures need to address barriers such as insufficient patient demand by implementing awareness campaigns at scale to improve understanding about HPV infection and vaccine safety among parents, and insurance plans to cover vaccination costs. Other logistical barriers such as ensuring proper storage and handling of vaccines, maintaining cold chain integrity, maintaining accurate records, and training pharmacists to administer vaccines safely and effectively, are often linked to cost-effectiveness. Stakeholders' initiatives, backed by policy measures such as collaboration and coordination between pharmacies, HCPs, in the context of immunization programs, are vital for the successful integration of PBV programs into existing immunization efforts. Implementing pharmacist-led educational interventions and collaborative models between pharmacies and primary care clinics can also help improve HPV vaccination rates, being the most important factors for overall acceptability of PBV programs.

This review encompassed studies from various countries and regions, examining the implementation of HPV vaccination programs. The objective was to provide a comprehensive understanding of the global landscape of HPV vaccination implementation. The findings of the review indicated significant progress in the implementation of HPV vaccination programs across many countries. It highlighted that several countries have achieved high vaccine coverage rates (VCRs), reaching the target population of adolescent girls and, in some cases, boys and adults. Countries like Canada, the United States, Brazil, South Africa, and Ireland, which have implemented PBV for HPV, report some of the highest VCRs in the world, with rates of 86%, 73%, 87%, 70%, and 84% respectively (10). These successful programs were often supported by strong political commitment, national vaccination strategies, such as the formation of the HPV Coalition and well-coordinated delivery systems. This spread confirms that most of the publications come from high-income countries, as most of PBV programs have been implemented in such countries.

An interesting resource in evaluating potential for the improvement of PBV programs, including all contemporary immunization programs, is the FIP report.

The report discusses the potential role of pharmacies in delivering life-course vaccinations. It highlights the importance of vaccinations throughout a person's life, from childhood to adulthood, and challenges in achieving high vaccination rates. The report emphasizes the accessibility and convenience of pharmacies as vaccination providers, as they are often located in communities and have extended hours of operation. It also mentions the trust and familiarity that people have with their local pharmacists, which

can contribute to increased vaccine acceptance. The report suggests that pharmacies can play a significant role in increasing vaccination rates by offering a wide range of vaccines, implementing re-call and reminder systems, and providing education and counseling to patients. It also discusses the need for collaboration between pharmacies, healthcare providers, public health agencies and authorities, to ensure a coordinated approach to vaccination delivery. The report concludes by highlighting the potential benefits of leveraging pharmacies to deliver life-course vaccinations, including improved vaccination rates, reduced healthcare costs, and increased overall public health protection.

Reports from high income countries such as the US and EU members states indicate that PBV programs may be implemented through accredited programs which include extensive theoretical and practical modules which include disease state, immunology revision, communication strategies, pharmacovigilance reporting and management of adverse events (27). It remains to be explored in a potential further analysis, a variance between different PBV programs and their effectiveness, due to socio-economic and cultural attitudes towards vaccination, and the organization of national healthcare systems across different regions and globally.

According to the WHO, 145 countries have ongoing HPV immunization programs, with over 500 million doses distributed globally. As of 2024, 57 countries have pharmacy-based vaccination programs, and 14–20 countries administer HPV vaccines through these programs. The ratio of countries with routine immunization to those with PBV programs is approximately 7:1 (1, 12).

The decision to implement a PBV program, being only one of the possible modalities to access vaccination, needs to be highly regulated and only certain pharmacies may comply with pre-specified requirements. By checking all the regulatory boxes, having their license updated with regular accredited training and having their facilities properly equipped, PBV programs and other pharmacy-led strategies may contribute to the improvement of VCRs against preventable HPV related diseases and illnesses.

Conclusion

From the revised literature, it has been established that PBV provides an effective solution to tackle some of the biggest barriers to the implementation of immunization programs globally.

Like other regions in the world, there have been successful educational programs delivered by the pharmacists locally. By empowering pharmacists and fostering effective communication and educational initiatives, PBV programs can significantly spread awareness and enhance VCRs against preventable HPV-related diseases. Additionally, PBV programs have been successful in reaching marginalized populations, such as low-income or minority groups, who may face structural barriers to healthcare access and typically may be in rural areas. To maximize the effectiveness of PBV programs, it is crucial to establish a robust infrastructure, which includes adequately trained staff,

established and regulated networks between the involved HCPs, and clear policies for vaccine handling.

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Declaration of Competing Interest

The authors report no potential conflicts of interest.

Author contributions

IRM and MO; conceptualization and data curation, visualization and methodology;IRM: formal analysis, investigation and writing - original draft; MO: funding acquisition, supervision, writing - review & editing.

References

1. Leveraging pharmacy to deliver life-course vaccination [Internet]. FIP report; 2024 [cited 2024 Nov 30]. Available from: https://www.fip.org/file/5848.
2. PGEU Pharmacy 2030: A vision for Community Pharmacy in Europe. Available from: https://www.pgeu.eu/publications/pharmacy-2030-a-vision-for-community-pharmacy-in-europe/.
3. Human Papillomavirus (HPV) [Internet]. Centers for Disease Control and Prevention (CDC); 2021 [cited 2024 Nov 30]. Available from: https://www.cdc.gov/hpv/parents/vaccine-for-hpv.html.
4. Vaccine Scheduler [Internet]. European Centre for Disease Prevention and Control (ECDC); 2021 [cited 2024 Nov 30]. Available from: https://vaccineschedule.ecdc.europa.eu/https://www.ema.europa.eu/en/medicines/human/EPAR/gardasil-9.
5. Immunization, Vaccines, and Biologicals - HPV Vaccine [Internet]. World Health Organization (WHO); 2021 [cited 2024 Nov 30]. Available from: https://www.who.int/immunization/diseases/hpv/en/.
6. Szymonowicz KA, Chen J. Biological and clinical aspects of HPV-related cancers. Cancer Biol Med. 2020;17(4):864–78.
7. Jit M, Prem K, Benard E, Brisson M. From cervical cancer elimination to eradication of vaccine-type human papillomavirus: Feasibility, public health strategies and cost-effectiveness. Prev Med. 2021;144:106354.

8. de Martel C, Georges D, Bray F, Ferlay J, Clifford GM. Global burden of cancer attributable to infections in 2018: a worldwide incidence analysis. Lancet Glob Health. 2020;8(2):e180-90.
9. Rajković D, Filipić B, Tadić I, Rakić M, Trunić M, Letić B, et al. Strengthening the role of the community pharmacy in HPV Vaccination Roll-out in Serbia at National and Local Levels [abstract]. In: IV Congress of Pharmacists of Montenegro with international participation; 2023 May 11–14; Budva, Bečići, Montenegro. p. 44.
10. Power BI WHO dashboard [Internet]. Geneva: World Health Organization; 2025 [cited 2025 Jan 26]. Available from: https://app.powerbi.com/view?r=eyJrIjoiNDIxZTFkZGUtMDQ1Ny00MDZkLThiZDktYWFlYTdkOGU2NDcwIiwidCI6ImY2MTBjMGI3LWJkMjQtNGIzOS04MTBiLTNkYzI4MGFmYjU5MCIsImMiOjh9
11. Partnership to Contrast HPV (PERCH project) [Internet]. European Union; 2023 [cited 2025 Jan 26]. Available from: https://health.ec.europa.eu/non-communicable-diseases/cancer/europes-beating-cancer-plan-eu4health-financed-projects/projects/perch_en
12. WHO Director-General calls for all countries to take action to help end the suffering caused by cervical cancer [Internet]. World Health Organization (WHO); 2020 [cited 2025 Jan 26]. Available from: https://www.uicc.org/what-we-do/driving-global-impact/targeted-commitments/global-strategy-elimination-cervical-cancer
13. Gardasil 9 human papillomavirus 9-valent vaccine (recombinant, adsorbed) [Internet]. European Medicines Agency; 2024 [cited 2025 Jan 26]. Available from: https://www.ema.europa.eu/en/medicines/human/EPAR/gardasil-9.
14. Dougherty S, Hayney MS. HPV9: Combating HPV-associated cancers by strengthening serotype defenses. J Am Pharm Assoc. 2025;55(6):670–2.
15. Filipic B, Rapajic-Moran I, Nikolic I, Oljacic S. Human papilloma viruses and cervical cancer from the perspective of the World Health Organization initiative for cervical cancer elimination. Arh farm. 2024;74:56–75.
16. Calo WA, Shah PD, Gilkey MB, Vanderpool RC, Barden S, Doucette WR, Brewer NT. Implementing pharmacy-located HPV vaccination: findings from pilot projects in five US states. Hum Vaccin Immunother. 2019. doi: 10.1080/21645515.2019.1602433.
17. Hastings TJ, Hohmann LA, McFarland SJ, Teeter BS, Westrick SC. Pharmacists' attitudes and perceived barriers to human papillomavirus (hpv) vaccination: A systematic literature review. Vaccines. 2021;9(11):1360.
18. Islam JY, Gruber JF, Kepka D, Kunwar M, Smith SB, Rothholz MC, et al. Pharmacist insights into adolescent human papillomavirus vaccination provision in the United States. Hum Vaccin Immunother. 2019. doi: 10.1080/21645515.2018.1556077.
19. Hohmeier KC, Randolph DD, Smith CT, Hagemann TM. A multimodal approach to improving human papillomavirus vaccination in a community pharmacy setting. SAGE Open Med. 2016;4. doi: 10.1177/2050312116682128.
20. Shah PD, Calo WA, Marciniak MW, Gilkey MB, Brewer NT. Support for pharmacist-provided HPV vaccination: National surveys of US physicians and parents. Cancer Epidemiol Biomarkers Prev. 2018;27(8):970–8.

21. Teeter BS, Mosley C, Thomas JL, Martin B, Jones D, Romero JR, Curran GM. Improving HPV vaccination using implementation strategies in community pharmacies: Pilot study protocol. Res Social Adm Pharm. 2020;16(3):336–41.
22. Maples JM, Zite NB, Oyedeji O, Chamberlin SM, Mastronardi AM, Gregory S, et al. Availability of the HPV vaccine in regional pharmacies and provider perceptions regarding HPV vaccination in the pharmacy setting. Vaccines. 2022;10(3):351.
23. Daniel CL, Lawson F, Vickers M, Green C, Wright A, Coyne-Beasley T, et al. Enrolling a rural community pharmacy as a Vaccines for Children provider to increase HPV vaccination: a feasibility study. BMC Public Health. 2021. doi: 10.1186/s12889-021-11304-8.
24. Brewer NT, Chung JK, Baker HM, Rothholz MC, Smith JS. Pharmacist authority to provide HPV vaccine: novel partners in cervical cancer prevention. Gynecol Oncol. 2014;132:S3-8.
25. Carney PA, Bumatay S, Kuo GM, Darden PM, Hamilton A, Fagnan LJ, Hatch B. The interface between US primary care clinics and pharmacies for HPV vaccination delivery: A scoping literature review. Prev Med Rep. 2022;28:101893.
26. Nielsen AR, Hayney MS. Human papillomavirus: a brief overview and recommendations for pharmacists. J Am Pharm Assoc. 2014;54(5):558–61.
27. Teeter BS, Jensen CR, Thomas JL, Martin BC, McElfish PA, Mosley CL, Curran GM. Perceptions of HPV vaccination and pharmacist-physician collaboration models to improve HPV vaccination rates. Explor Res Clin Soc Pharm. 2021;2:100014.
28. Koskan A, Zittel ME, Lee C, Sanchez O, Alvarez L, Helitzer DL. The feasibility and acceptability of a pilot randomized controlled trial testing pharmacy-based HPV vaccine completion. Res Social Adm Pharm. 2022;18(6):3038–45.
29. Doucette WR, Kent K, Seegmiller L, McDonough RP, Evans, W. Feasibility of a coordinated human papillomavirus (HPV) vaccination program between a medical clinic and a community pharmacy. Pharmacy. 2019;7(3):91.
30. Rothholz M, Tan L. Promoting the immunization neighborhood: benefits and challenges of pharmacies as additional locations for HPV vaccination. Hum Vaccin Immunother. 2017;13(8):1856–8.
31. Cernasev A, Hohmeier KC, Oyedeji O, Kintziger KW, Hagemann TM. Views of the Pharmacists' Role in HPV Vaccinations: A Qualitative Study in Tennessee. Pharmacy. 2024;12(2):57.
32. Wick JA, Elswick BM. Impact of pharmacist delivered education on early parent awareness and perceptions regarding human papillomavirus (HPV) vaccination in the community pharmacy setting in West Virginia. Innov Pharm. 2018;9(3):1–6.
33. Koskan A, Vizcaino M, Brennhofer SA, Lee CD, Roberto AJ. Human papillomavirus vaccine administration behaviors and influences among Arizona pharmacists and pharmacy interns. Hum Vaccin Immunother. 2021;17(9):3090–5.
34. Vanderpool RC, Stradtman LR, Brandt HM. Policy opportunities to increase HPV vaccination in rural communities. Hum Vaccin Immunother. 2019. doi: 10.1080/21645515.2018.1553475.
35. Navarrete JP, Padilla ME, Castro LP, Rivera JO. Development of a community pharmacy human papillomavirus vaccine program for underinsured university students along the United States/Mexico border. J Am Pharm Assoc. 2014;54(6):642–7.

36. Cartmell KB, Young-Pierce J, McGue S, Alberg AJ, Luque JS, Zubizarreta M, Brandt HM. Barriers, facilitators, and potential strategies for increasing HPV vaccination: A statewide assessment to inform action. Papillomavirus Res. 2018;5:21–31.
37. Shah PD, Gilkey MB, Pepper JK, Gottlieb SL, Brewer NT. Promising alternative settings for HPV vaccination of US adolescents. Expert Rev Vaccines. 2014;13(2).235–46.
38. Koskan AM, Dominick LN, Helitzer DL. Rural caregivers' willingness for community pharmacists to administer the HPV vaccine to their age-eligible children. J Cancer Educ. 2021;36(1):189–98.
39. Calo WA, Gilkey MB, Shah P, Marciniak MW, Brewer NT. Parents' willingness to get human papillomavirus vaccination for their adolescent children at a pharmacy. Prev Med. 2017;99:251–6.
40. Trogdon JG, Shafer PR, Shah PD, Calo WA. Are state laws granting pharmacists authority to vaccinate associated with HPV vaccination rates among adolescents? Vaccine. 2016;34(38):4514–9.
41. Zahnd WE, Harrison SE, Stephens HC, Messersmith AR, Brandt HM, Hastings TJ, Eberth JM. Expanding access to HPV vaccination in South Carolina through community pharmacies: a geospatial analysis. J Am Pharm Assoc. 2020;60(6):e153-7.
42. Zhang S, Kwach B, Omollo V, Asewe M, Malen R, Shah PD, et al. The Acceptability of Pharmacy-Based HPV Vaccination in Western Kenya among Pharmacy Clients and Providers. Vaccines. 2023;11(12):1808.
43. Shah PD, Calo WA, Marciniak MW, Golin CE, Sleath BL, Brewer NT. Service quality and parents' willingness to get adolescents HPV vaccine from pharmacists. Prev Med. 2018;109:106–12.
44. Fava JP, Colleran J, Bignasci F, Cha R, Kilgore PE. Adolescent human papillomavirus vaccination in the United States: opportunities for integrating pharmacies into the immunization neighborhood. Hum Vaccin Immunother. 2017;13(8):1844–55.
45. Westrick SC, Hohmann LA, McFarland SJ, Teeter BS, White KK, Hastings TJ. Parental acceptance of human papillomavirus vaccinations and community pharmacies as vaccination settings: A qualitative study in Alabama. Papillomavirus Res. 2017;3:24–9.
46. Tolentino V, Unni E, Montuoro J, Bezzant-Ogborn D, Kepka D. Utah pharmacists' knowledge, attitudes, and barriers regarding human papillomavirus vaccine recommendation. J Am Pharm Assoc. 2018;58(4):S16-23.
47. Fernandes A, Wang D, Domachowske JB, Suryadevara M. HPV vaccine knowledge, attitudes, and practices among New York state medical providers, dentists, and pharmacists. Hum Vaccin Immunother. 2023;19(2):2219185.
48. Strasel M, VanLangen KM, Benzer J, Geyer A, Jameson AP, Dumkow LE. HPV vaccination rates in 9-and 10-year-olds following a pharmacist-led intervention. J Am Pharm Assoc. 2024;64(1):278–82.
49. Bouanani I. HPV Vaccine Administration in Community Pharmacies [Internet]. 2020 [cited 2025 Jan 26]. Available from: https://keep.lib.asu.edu/items/130991.
50. Shah PD, Trogdon JG, Golden SD, Golin CE, Marciniak MW, Brewer NT. Impact of pharmacists on access to vaccine providers: a geospatial analysis. Milbank Q. 2018;96(3):568–92.
51. Shah PD. The role of pharmacy in HPV vaccination of US adolescents [Internet]. 2017 [cited 2025 Jan 26]. Available from: https://cdr.lib.unc.edu/concern/dissertations/0g354f698?locale=en.

52. Cebollero J, Walton SM, Cavendish L, Quairoli K, Cwiak C, Kottke MJ. Evaluation of human papillomavirus vaccination after pharmacist-led intervention: A pilot project in an ambulatory clinic at a Large academic urban medical center. Public Health Rep. 2020;135(3):313–21.
53. Dufour L, Carrouel F, Dussart C. Human Papillomaviruses in Adolescents: Knowledge, Attitudes, and Practices of Pharmacists Regarding Virus and Vaccination in France. Viruses. 2023;15(3):778.
54. Iqbal MS, Iqbal MZ, Bahari MB. Effectiveness of pharmacists-led provider-focused interventions to improve HPV vaccination rates in adults in Malaysia. Value Health. 2016;19(7):A424.
55. Dingman DA, Schmit CD. Authority of pharmacists to administer human papillomavirus vaccine: alignment of state laws with age-level recommendations. Public Health Rep. 2018;133(1):55–63.
56. Shah PD, Marciniak MW, Golden SD, Trogdon JG, Golin CE, Brewer NT. Pharmacies versus doctors' offices for adolescent vaccination. Vaccine. 2018;36(24):3453–9.
57. Yoost J, Ditrapano N, Ranavaya J, Redmond K. Parent and provider views of using pharmacies for HPV vaccination in adolescents. J Pediatr Adolesc Gynecol. 2021;34(2):274–5.
58. Jiménez-Quiñones EM, Melin K, Jiménez-Ramírez FJ. Impact of a pharmacist conducted educational program on human papilloma virus vaccination rates in a low socioeconomic population in the city of Lares, PR. P R Health Sci J. 2017;36(2):67–70.
59. Cannon HE. Pharmacy management of vaccines. J Manag Care Pharm. 2007;13(7):S7-11.
60. Sasaki A, Nakao Y, Obara T, Abe S, Yamaguchi H, Yoshimachi S, Goto T. Knowledge and Attitude towards Cervical Cancer and Human Papillomavirus among Pharmacists in Japan. Asian Pac J Cancer Prev. 2021;22(7):2259–65.
61. Roman M, Cruz MRD, Soon R, Ma C, Chen, JJ. Understanding Factors Affecting Health Providers' Perceptions of Pharmacist Roles in HPV Vaccine Administration. Hawaii J Health Soc Welf. 2024;83(4):92–8.
62. Brown V, Tsuyuki RT. The pharmacist's role in prevention of HPV-related cancers. Can Pharm J. 2021;154(4):228–31.
63. Islam JY, Gruber JF, Lockhart A, Kunwar M, Wilson S, Smith SB, et al. Opportunities and challenges of adolescent and adult vaccination administration within pharmacies in the United States. Biomed Inform Insights. 2017. doi: 10.1177/1178222617692538.
64. Ryan G, Daly E, Askelson N, Pieper F, Seegmiller L, Allred T. Exploring Opportunities to Leverage Pharmacists in Rural Areas to Promote Administration of Human Papillomavirus Vaccine. Prev Chronic Dis. 2020;17:E23.
65. Skiles MP, Cai J, English A, Ford CA. Retail pharmacies and adolescent vaccination—An exploration of current issues. J Adolescent Health. 2011;48(6):630–2.
66. Berce PC, Bernstein RS, MacKinnon GE, Sorum S, Martin E, MacKinnon KJ, et al. Immunizations at Wisconsin Pharmacies: Results of a statewide vaccine registry analysis and pharmacist survey. Vaccine. 2020;38(28):4448–56.
67. Julia B, Farge G, Mourlat B, Mamane C, Bensimon L, Hommel C, Conan G. Facilitating human papillomavirus vaccination pathways by extending vaccination competencies to community pharmacists: A cross-sectional survey on the acceptability and expectations among healthcare professionals and parents. Explor Res Clin Soc Pharm. 2023;10:100255.
68. Mohamed R, Kelly KM, Nili M, Kelley GA. A systematic review with meta-analysis of parental interventions for human papillomavirus vaccine uptake. J Am Pharm Assoc. 2022;62(4):1142–53.

69. Corke P, Jones J, Gudka S. Evidence of the Role of Pharmacy-Based Interventions in Sexually Transmitted Infections. In: Encyclopedia of Evidence in Pharmaceutical Public Health and Health Services Research in Pharmacy. 2022; p. 581–99. doi.org/10.1007/978-3-030-64477-2_102.
70. Lutz CS, Kim DK, Black CL, Ball SW, Devlin RG, Srivastav A, et al. Clinicians' and pharmacists' reported implementation of vaccination practices for adults. Am J Prev Med. 2018;55(3):308–18.
71. Lam JH, Singh S, Kuo GM. Comparisons of immunization records between a community pharmacy, a regional registry, and a health system. J Am Pharm Assoc. 2019;59(1):30–4.
72. Palmer J, Carrico C, Costanzo C. Identifying and overcoming perceived barriers of providers towards HPV vaccination: a literature review. J Vaccin. 2015;1:869468.
73. Strand MA, Mager NAD, Hall L, Martin SL, Sarpong DF. Pharmacy contributions to improved population health: expanding the public health roundtable. Prev Chronic Dis. 2020;17:E113.
74. Rubin R. Why the "no-brainer" HPV vaccine is being ignored. Jama. 2015;313(15):1502–4.
75. Herrman A, Ruisinger JF, Moore EE, Melton BL. Assessing the impact of a pharmacy-provided personalized vaccination recommendation on immunization rates of adolescents. J Am Pharm Assoc. 2023;63(4):S43-7.
76. Rothholz MC. The role of community pharmacies/pharmacists in vaccine deliver in the United States [Internet]. 2013 [cited 2025 Jan 26]. Available from: https://stacks.cdc.gov/view /cdc/76424/cdc_76424_DS1.pdf.
77. Chadi A, Thirion DJG, David PM. Vaccine promotion strategies in community pharmacy addressing vulnerable populations: a scoping review. BMC Public Health. 2023;23(1):1855.
78. DiTrapano N, Redmond K, Ranavaya J, Yoost J. Appalachian Parent and Provider Views on the Use of Pharmacies for Human Papillomavirus Vaccination in Adolescents. Marshall J Med. 2022;8(2):5.
79. Westrick SC, Patterson BJ, Kader MS, Rashid S, Buck PO, Rothholz MC. National survey of pharmacy-based immunization services. Vaccine. 2018;36(37):5657–64.
80. McRee AL, Reiter PL, Pepper JK, Brewer NT. Correlates of comfort with alternative settings for HPV vaccine delivery. Hum Vaccin Immunother. 2013;9(2):306–13.
81. Targhotra M, Dhamoon RK, Verma S. Cervical Cancer- A Disease Affecting Millions Sch. Acad. J. Pharm. 2018; 7(2): 99-104. doi: 10.21276/sajp.2018.7.2.6
82. Isenor JE, Bowles SK. Opportunities for pharmacists to recommend and administer routine vaccines. Can Pharm J. 2019;152(6):401–5.
83. Brandt HM, Vanderpool RC, Curry SJ, Farris P, Daniel-Ulloa J, Seegmiller L, et al. A multi-site case study of community-clinical linkages for promoting HPV vaccination. Hum Vaccin Immunother. 2019;15:1599–606.
84. Nguyen-Huu NH, Thilly N, Derrough T, Sdona E, Claudot F, Pulcini C, Agrinier N. HPV Policy Working Group. Human papillomavirus vaccination coverage, policies, and practical implementation across Europe. Vaccine. 2020;38(6):1315–31.
85. Houle SKD, Alsabbagh MW, Waite NM. Herpes zoster and human papillomavirus vaccination opportunities identified using electronic prompts at the time of scheduling influenza or COVID-19 vaccines. Can Pharm J. 2023;156(5):257–64.
86. Pittman E, Ford MA, Barnard M, Tschumpter E, Earl S, Gautreaux J. Launching a Human Papillomavirus Vaccination (HPV) Campaign on a College Campus during the COVID-19 Pandemic. J Public Health Deep South. 2022;3(1):8.

87. Philbrick AM, Frail CK, Rhee TG. Human Papillomavirus Vaccine: An Opportunity for Minnesota Pharmacists to Impact Public Health. J Am Pharm Assoc. 2018; 58:S16-23 doi.org/10.1016/j.japh.2018.04.014
88. Gonzalez PR, Black EK, Trenaman S, Wilby KJ. Improving equity of services for sexually transmitted infections through community pharmacies: a scoping review. J Am Pharm Assoc. 2024;64(1):197-203.e2.
89. Risley C, Filzen AF, Ellis A, Jones SM, Tucker L, Farrington K, et al. Opening New Pathways to HPV Cancer Prevention through Changes in Practice, Policy, and Partnerships. Acad Sci. 2022;67:396.
90. Hogue MD, Foster S, Rothholz MC. Shared clinical decision making on vaccines: Nothing has really changed for pharmacists. J Am Pharm Assoc. 2020;60(6):e91-4.
91. Richman AR, Haithcox-Dennis MJ, Allsbrook AR. Feasibility of a catch-up HPV vaccination program among college students attending a large rural university in the south. Am J Sex Educ. 2012;7(3):237–52.
92. Levy MS, Finch L, Lindsay KA, Jeudin P, Huang M. Leveraging teachable moments in cancer prevention by improving HPV vaccination in health professional students (HPS): A systematic review. Front Oncol. 2022;12:978843.
93. Welch AC. Pharmacist immunization services evolving for multiple-dose series. J Am Pharm Assoc. 2016;56(4):467–70.
94. Koskan A, Brennhofer SA, Helitzer D. Administering the HPV Vaccine to People Living with HIV: Providers' Perspectives. J Prim Prev. 2020;41(4):349–62.
95. Oleksyn C. The role of pharmacists in providing recommended vaccines. Can Pharm J. 2019;152(6):406–10.
96. Valentino K, Poronsky CB. Human papillomavirus infection and vaccination. J Pediatr Nurs. 2016;31(2):e155-66.
97. Peterson CE, Silva A, Holt HK, Balanean A, Goben AH, Dykens JA. Barriers and facilitators to HPV vaccine uptake among US rural populations: a scoping review. Cancer Causes Control. 2020;31:801–14.
98. Klein K, Luedtke S. Advocacy Committee of the Pediatric Pharmacy Advocacy Group. Human papillomavirus vaccination: a case for mandatory immunization? J Pediatr Pharmacol Ther. 2008;13(1):47–50.
99. Weygandt J. A comprehensive multi-level approach to increasing HPV vaccination rates in rural Kentucky [Internet]. 2017 [cited 2025 Jan 26]. Available from: https://uknowledge.uky.edu/cph_etds/154.
100. Baroy J, Chung D, Frisch R, Apgar D, Slack MK. The impact of pharmacist immunization programs on adult immunization rates: a systematic review and meta-analysis. J Am Pharm Assoc. 2016;56(4):418–26.
101. Navarrete J, Yuksel N, Schindel TJ, Hughes CA. Sexual and reproductive health services provided by community pharmacists: a scoping review. BMJ Open. 2021;11(7):e047034.
102. White MC, Osazuwa-Peters OL, Abouelella DK, Barnes JM, Cannon TY, Watts TL, et al. Trends and factors associated with receipt of human papillomavirus (HPV) vaccine in private, public, and alternative settings in the United States. Vaccine. 2024;42(22):126036.

103. Christy SM, Fuzzell LN, Lake PW, Staras S, Colon LV, Best A, Hull PC, Vadaparampil ST. Community-Based Interventions for HPV Vaccination. In: Cancer Health Disparities: From Determinants of Disparities to Solutions for Equity. Springer 2023; p. 147–81.
104. Stupiansky NW, Rosenthal SL, Wiehe SE, Zimet GD. Human papillomavirus vaccine acceptability among a national sample of adult women in the USA. Sex Health. 2010;7(3):304–09.
105. Kombe AJK, Zoa-Assoumou S, Bounda GA, Nsole-Biteghe FA, Jin T, Zouré AA. Advances in Etiopathological Role and Control of HPV in Cervical Cancer Oncogenesis. Front Biosci (Landmark Ed). 2023;28(10):245.
106. Carney PA, Bumatay S, Kuo GM, Darden PM, Hamilton A, Fagnan LJ, Hatch B. The interface between U.S. primary care clinics and pharmacies for HPV vaccination delivery: A scoping literature. Prev Med Rep. 2022;28:101893.
107. Easwaran V, Shorog EM, Alshahrani AA, Mohammad AAS, Sadiq MMJ, Alavudeen SS, et al. Knowledge, Attitudes, and Practices Related to Cervical Cancer Prevention and Screening among Female Pharmacy Students at a Public University in a Southern Region of Saudi Arabia. Healthcare (Basel). 2023;11(20):2798.
108. Shah PD, Calo WA, Marciniak MW, Gilkey MB, Brewer NT. Support for Pharmacist-Provided HPV Vaccination: National Surveys of U.S. Physicians and Parents. Cancer Epidemiol Biomarkers Prev. 2018;27(8):970–8.
109. Finch LA, Levy MS, Thiele A, Jeudin P, Huang M. Barriers to cervical cancer prevention in a safety net clinic: gaps in HPV vaccine provider recommendation and series completion among Ob/Gyn patients. Front Oncol. 2024;14:1359160.
110. Agana-Norman DFG, Martinez Martinez M, Shanmugasundaram M, Berenson AB. Understanding Barriers to Human Papillomavirus Vaccination among Parents of 9-10-Year-Old Adolescents: A Qualitative. Vaccines (Basel). 2024;12(3):245.
111. Curran G, Mosley C, Gamble A, Painter J, Ounpraseuth S, Brewer NT, et al. Addressing COVID-19 vaccine hesitancy in rural community pharmacies: a protocol for a stepped wedge randomized clinical trial. Implement Sci. 2023;18(1):72.
112. Daniel CL, Wright AR. Increasing HPV Vaccination in Rural Settings: The Hidden Potential of Community Pharmacies. J Rural Health. 2020;36(4):465–7.
113. Cataldi JR, Brewer SE, Perreira C, Furniss A, Nederveld A, Suresh K, et al. Rural Adolescent Immunization: Delivery Practices and Barriers to Uptake. J Am Board Fam Med. 2021;34(5):937–49.
114. Grabenstein JD. High expectations: standards and guidelines for immunization delivery. Hosp Pharm. 2000;35:841–51.

Implementacija vakcinacije u apotekama protiv humanog papiloma virusa: Pregled literature

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Kratak sadržaj

U većini zemalja EU, farmaceuti kao zdravstveni radnici u zajednici mogu pružati obrazovne i vakcinalne usluge, što može poboljšati pogodnost i dostupnost za pacijente. Ovo je posebno važno u oblastima gde su stope vakcinacije (VCR) suboptimalne i u nedovoljno opskrbljenim područjima gde je pristup zdravstvenim radnicima (HCP) ograničen. Cilj ovog pregleda je da opiše uticaj i izvodljivost programa vakcinacije vezanih za humani papiloma virus (HPV) koji se sprovode u apotekama. Nalazi ukazuju na to da širenje pristupa vakcinama putem apoteka ima potencijal da poboljša stope imunizacije, posebno u nedovoljno opskrbljenim ili teško dostupnim populacijama. Uloge farmaceuta kao pobornika, edukatora i pružalaca usluge vakcinacije mogu prevazići prepreke, poboljšati svest i podstaći prihvatanje vakcina. Saradnja sa drugim zdravstvenim radnicima je ključna za omogućavanje sveobuhvatnog pristupa promociji HPV vakcinacije. Zaključak je da programi vakcinacije u apotekama imaju potencijal da budu efikasna strategija za poboljšanje stopa imunizacije u ruralnim i urbanim oblastima. Integracija apoteka, kroz multidisciplinarni pristup u programe imunizacije protiv HPV-a, može proširiti pristup, povećati svest, pružiti obrazovanje, razjasniti zabrinutosti, povećati pogodnost i dostići nedovoljno opskrbljene populacije. Međutim, pažljivo planiranje, obuka i saradnja sa drugim zdravstvenim radnicima kao što su lekari i medicinske sestre su neophodni da se prevaziđu izazovi i obezbedi sigurna i efikasna isporuka vakcina putem apoteka.

Ključne reči: apoteka, HPV, vakcinacija, javno zdravstvo, urban, ruralan