



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



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ABSTRACT

Background: Human papillomavirus (HPV) vaccination coverage rate (VCR) remains low in France (37.4% in girls in 2021). The French health authority recommended in 2022 to extend vaccination competencies to additional healthcare providers (HCPs), including community pharmacists (CPs).

Objectives: To understand the acceptability by general practitioners (GPs), CPs and parents of adolescents of extending vaccination competencies and to identify benefits and barriers of new vaccination pathways.

Methods: This cross-sectional research used a qualitative and quantitative approach. For the quantitative survey, GPs, CPs and parents of adolescents eligible to HPV vaccination completed an online questionnaire. Participants were asked to imagine themselves in different pathways and evaluate them.

Results: A total of 200 GPs, 201 CPs and 800 parents were included. The level of acceptability of extending vaccination competencies to other HCPs was high in CPs (86% rated $\geq 7/10$), but low in GPs (35%) and intermediate in parents (61%). Parents ranked first (44%) a pathway where GPs prescribed while CPs vaccinated because GPs inspire confidence as vaccine prescribers (80%) and parents prefer to be informed on vaccination by them (80%). CPs ranked first (42%) a scenario where they vaccinated after invitation of adolescents from the French National Health Insurance Fund (NHIS). They emphasized the simplicity of this scenario (94%) and the potential increase of VCR (91%), but asked to be more informed on HPV vaccination (77%) and favored television (83%) for communication campaigns.

Conclusions: GPs and parents, in contrast with community pharmacists, were only moderately supportive of the extension the vaccination competencies. Confidence in the HCP remains the primary factor for adherence to a vaccination pathway beyond the simplicity of the pathway. Training of CPs, traceability tool, support from authorities and communication campaigns are levers that will support CPs in their new role and contribute to increase parents' acceptability toward CPs.

1. Introduction

Persistent human Papillomavirus (HPV) infection can lead to several diseases in men and women including precancerous lesions and cancers, anogenital warts and recurrent respiratory papillomatosis.^{1,2} Vaccines have been developed to prevent HPV infections.³ In France, vaccination against HPV infections was first introduced in July 2007 in girls. In January 2021, the recommendation made by HAS for the extension of the national

HPV program to boys was applicable. Therefore, vaccination against HPV infections is recommended for girls and boys aged 11 to 14 years with a two-dose schedule, and catch-up for girls and boys aged 15 to 19 years who were not previously vaccinated (three-dose schedule).⁴ HPV vaccination is also recommended in immunosuppressed individuals and in men having sex with men up to age 26.

However, vaccination coverage (VC) in France remains one of the lowest in Europe. In 2021, VC for girls reached 37.4% for the complete

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schedule at 16 years of age and 6.0% in boys (at least one dose).^{5,6} This rate is well below the 80% target announced in the ten-year cancer control strategy defined by the National Cancer Institute for 2021–2030⁷ and the World Health Organization (WHO) target of 90% of girls fully vaccinated by the age of 15 published.⁸

One of the reasons contributing to this low HPV coverage rate and highlighted by HAS is the complexity of the HPV vaccination pathway.^{9,10} The current HPV vaccination pathway focuses on GPs and community pharmacists are not permitted to prescribe or administer the HPV vaccine. Thus, for each of the two or three doses of vaccines, a medical visit to obtain a vaccine prescription is required, followed by the delivery of the vaccine at the pharmacy, and then a medical visit for the vaccine administration by the GP. Moreover, the adolescent population rarely consult GPs¹¹ and there is currently no school HPV vaccination program in France.

The potential for community pharmacists to recommend and administer the HPV vaccine has gained attention among pharmacist professionals and public health researchers as a strategy for increasing vaccine coverage rate.¹² Community pharmacists are already involved in HPV vaccination in different countries (e.g., United States, United Kingdom, New Zealand), but published data are limited outside the United States.¹³ Some studies showed that the main perceived barriers from parents and adolescents were concerns about training of community pharmacists for HPV vaccination; for community pharmacists, the most commonly reported concern was the lack of information, ability to answer parents' questions and organizational barriers (time and staff capacity).^{13–23} The role of community pharmacists has evolved and they could play an important role in HPV vaccination and the increase of VCR because of their availability, cost-effectiveness, and involvement in health education.²⁴

To facilitate vaccination pathways – as is already the case for the influenza vaccine since 2019 and COVID since 2021 – the French Health Authority (HAS) recommended in 2022 the involvement of additional vaccinators (i.e., community pharmacists, nurses and midwives) by extending their competencies.^{9,10} Community pharmacists will be authorized to administer (by November 2022) and prescribe (expected in Q3–2023) vaccines for infants aged 24 months and older, adolescents and adults, including the HPV vaccine. To provide these services, community pharmacists must complete dedicated training and implement traceability and decision support tools.^{9,10} In France, between 70% and 90% of licensed pharmacies have certification to administer vaccines.²⁵ Pharmacy density is high and community pharmacists are already on the front line for advising about vaccination. It was therefore of great interest to assess the perception and expectations of healthcare providers (HCPs) and parents of adolescents toward new vaccination pathways enhancing community pharmacist's contributions and roles in HPV vaccination.

The primary objective of this study was to understand the acceptability by HCPs and parents of adolescents of extending vaccination competencies to community pharmacists for HPV vaccination. The second objective was to identify the benefits and barriers of future vaccination pathways.

2. Materials and methods

2.1. Type of study

This was a cross-sectional survey with primary data collection based on a complementary qualitative and quantitative approach. The study was conducted among GPs, community pharmacists and parents of adolescents eligible to the HPV vaccination.

The study was conducted in two phases. The qualitative phase, conducted in January–February 2022, consisted of focus groups with GPs, community pharmacists, physicians in international centers of vaccination (ICVs) and parents of adolescents. The results of the qualitative phase provided the basis for the development of the quantitative questionnaires. The quantitative phase consisted of an online survey administered to GPs, community pharmacists and parents of eligible adolescents in June 2022. The study was performed by a survey institute (IQVIA, Paris, France) using an established panel of HCPs and consumers.

2.2. Ethics

The survey was conducted in accordance with the ESOMAR International Code on Market and Social Practice, the EphMRA Code of Conduct, relevant national and international European legislation on medical research, and Good Pharmacoepidemiologic Practice guidelines. Use of the IQVIA panels partners for medical research has been approved by the French national committee in charge of personal data protection (Commission Nationale de l'Informatique et des Libertés; CNIL). In the screening questionnaire, all participants had to give their consent online to the collection and analysis of their data. They were reassured that their participation was voluntary and that they were free to withdraw at any time. The anonymous online questionnaires were completed only by those who gave their consent. The study design assured adequate protection of the participants. Hence, this study was exempted from ethical approval.

2.3. Participants

GPs were identified from IQVIA's OneKey database and community pharmacists were identified from IQVIA's Pharmastat database. For the quantitative phase, the quota method was applied to ensure demographic representativeness of the sample with respect to all French GPs or community pharmacists using data from the national agency for economic statistics (DREES). Parents of adolescents were enrolled from Cint, a consumer network for digital survey research (3.5 million in France). The Cint panel is representative of the consumer population in France in terms of gender, age, socio-professional category and region.

Participants were asked to complete a screening questionnaire to ensure that eligibility criteria were fulfilled. To be included, HCPs had to be between 30 and 65 years old and have at least two years of experience. GPs were required to be office-based only, managing eligible adolescents (11–19 years), and involved in vaccine recommendation and prescription. Pharmacists had to work in a community pharmacy (owner and at least 30% behind the counter) and 70% to 80% of the respondents had to be involved in vaccine dispensing. Parents of adolescents had to be parent of at least one eligible adolescent (11–19 years) and be favorable to vaccination.

All participants of qualitative and quantitative phases received a fair market value monetary compensation for their time.

2.4. Qualitative phase

The qualitative phase allowed to gather spontaneous feedbacks of HCPs and parents of eligible adolescents to HPV vaccination. This investigation was based on focus groups. This type of group interaction is appropriate to allow participants to share their personal experience and for HCPs to debate with each other to identify the similarities and differences in terms of practice. All focus groups were based on a semi-structured discussion guide to harmonize the conversation flow across respondents of each targeted group. A total of six focus groups among HCPs and parents of adolescents were conducted online on a dedicated interview platform (Partner Platform: Professional Research): two focus groups with parents ($n = 13$ for the two groups), two with community pharmacists ($n = 9$ for the two groups), one with GP ($n = 6$) and one with physicians with responsibilities in ICV ($n = 4$). Interviews were moderated by highly trained qualitative interviewers and recorded with the permission from study participants.

Four main themes were investigated in the qualitative phase: level of awareness about HPV and gender-neutral HPV vaccination; acceptability to extend gender-neutral HPV vaccination to community pharmacists; expected needs and conditions required to ensure the success of extending vaccination skills; identification of facilitators and barriers associated to the current gender-neutral HPV vaccination pathway from the perspective of GPs and parents of eligible adolescents. Then, participants were presented with different possible scenarios for HPV vaccination involving new vaccinators (Table 1). They were asked to describe the potential strengths and weaknesses of each vaccination pathway in terms of simplicity, accessibility, traceability and impact on immunization coverage.

Table 1
The current HPV vaccination pathway and the four vaccination scenarios that were proposed to the participants of the survey.

	Identification	Prescription	Dispensing	Injection
Current pathway	GP	GP	Pharmacist	GP
New pathways				
A	GP	Pharmacist		
B	Pharmacist			
C	Public Health insurance	Pharmacist	GP	
D	Public Health insurance	Pharmacist		

Current pathway	The general practitioner identifies adolescents eligible for the HPV vaccine and prescribes; the community pharmacist dispenses the vaccine and the general practitioner vaccinates.
Scenario A	The general practitioner identifies adolescents eligible for the HPV vaccine and prescribes. Then the community pharmacist dispenses the vaccine and vaccinates.
Scenario B	The community pharmacist identifies eligible adolescents for HPV vaccine and prescribes, dispenses and vaccinates.
Scenario C	The parents of adolescents eligible for the HPV vaccine receive an invitation from the National Health Insurance Fund that allows them to purchase the vaccine directly from the pharmacy before having their child vaccinated by their GP.
Scenario D	The parents of adolescents eligible for the HPV vaccine receive an invitation from the National Health Insurance Fund that allows them to purchase the vaccine directly from the pharmacy and have their child vaccinated there.

GP, general practitioner; HPV, human papillomavirus; PH, community pharmacist.

Once the fieldwork was completed, the audio recording was transcribed and then used for aggregation of results and analysis. For the analysis of the qualitative phase, no qualitative analysis software was used. The dedicated analyst relied on the transcriptions of the focus groups for basic observation or patterns in order to fill an Excel framework document with all the verbatims of the respondents. This document was used to count ideas, concepts, behaviors, or phrases by looking for the most common responses to questions and identifying data or patterns that might answer the research question. Qualitative interviews finally provided a first understanding of respondents' perception and expectations, and a better understanding of the environment. It informed their point of views, provided a tendency, and informed the criteria measured afterwards in the quantitative phase.

2.5. Quantitative phase

Based on the results from the qualitative approach, an online questionnaire was developed for each target (specific questionnaires are available as Supplementary material). This questionnaire was used to measure the trends observed in the qualitative phase. Questionnaires were pretested by experts from an ad-board, including two community pharmacists and one physician, for clarity, wording, interpretability, and relevance of the survey items. Pre-testing ensured also that questionnaire completion fitted into the indicative time (i.e., 20 min for pharmacists, 30 min for GPs and 40 min for parents).

Different types of questions were asked, including binary choice closed questions, multiple response closed questions and 10-point scores. GPs were asked specific questions about their practice, profile of patients and medical activity concerning HPV vaccination, while community pharmacists were asked on client profile, vaccination practice within the pharmacy and activity regarding HPV vaccination. Parents were asked about their family, healthcare management, perception of vaccination, and knowledge about HPV infection and vaccination. Regarding the extension of HPV vaccination to other HCPs in addition to GPs, different scenarios were proposed to all participants. Participants were asked to imagine themselves in different vaccination pathways and to give their perception and opinion on each of them (Table 1). Respondents could not skip any questions, so no missing values were recorded.

Participants from the qualitative phase were not included in the quantitative phase. The role of ICVs was poorly perceived and therefore physicians of ICVs were not surveyed in the quantitative phase.

2.6. Statistical analysis

Only data from the quantitative phase were analyzed using statistics. The analysis was descriptive, using frequency with percentages for categorical variables. For the ordinal rating scales, results are presented either as a mean score or as a percentage of participants providing scores in the range 7–10. All data were analyzed separately for each target.

To calculate an appropriate representative sample, we established that a sample of 200 GPs or community pharmacists would allow a margin of error from 3.0% to 6.9% with 95% confidence level. For parents, the sample size was calculated to allow subgroup analyses: with 666 parents, the margin of error was 5.0% with 95% confidence level and 800 parents were finally included for a sufficient robustness of the analyses.

GPs and community pharmacists were stratified according to age, gender and geographical distribution (regions). Community pharmacists were stratified according to annual sales revenue. Parents of adolescents were stratified according to socio-professional category, gender of the adolescent and geographical distribution (regions).

Correlation analyses were performed to measure the strength of a linear association between the acceptability of parents toward the extension of vaccination competencies and several factors. The Pearson correlation coefficient (r-value) was calculated for each factor; it varies from +1 (perfect positive correlation) to -1 (perfect negative correlation). A value of 0 indicates that there is no association.

Data were analyzed using IBM SPSS (Statistical Package for Social Sciences) software.

3. Results

3.1. Qualitative phase

The verbatims from the qualitative phase and the scenarios discussed highlighted how the HCPs were perceived and the role they could play in the context of extending HPV vaccination beyond physicians. In this section, we present the synthesis of the qualitative phase. Details on participants' verbatims are presented as Supplementary material.

3.1.1. GPs

Overall, GPs have a good image and parents have a high level of confidence in them, particularly for counselling and prescribing the HPV

vaccine. The role of the GP in the administration of the vaccine appears less essential. However, some HCPs are divided on the impact in terms of optimizing vaccination coverage if the vaccination pathway still relies primarily on the GP.

3.1.2. Community pharmacists

The community pharmacists are generally seen as potential facilitators in the vaccination process, in particular because of the proximity of pharmacies. Community pharmacists are less easily seen as prescribers of vaccines. Nevertheless, community pharmacists are appreciated for their advisory role. In addition, the pharmacy as a single location for dispensing and injection is considered to allow a better traceability of vaccines. Concerning more specifically HPV vaccination, community pharmacists express their need for training.

3.1.3. French national health insurance fund

National Health Insurance Fund is considered a key player. A letter and communication campaign are seen as potentially very useful to improve HPV vaccination coverage. In particular, sending a letter to parents would give a status to the vaccine, placing it as a public health priority in their minds. An invitation sent by the National Health Insurance Fund would relieve also community pharmacists of the task of selecting eligible adolescents.

3.1.4. ICVs

These structures are dedicated to the vaccination of travelers going abroad, mainly the vaccination against yellow fever. Their role is poorly perceived because of their lack of convenience and the unknown degree of confidence to be placed in them. They should be considered only as a complementary player in HPV vaccination, with probably limited impact. Therefore, they were not included in the quantitative phase.

3.2. Quantitative phase

3.2.1. Characteristics of participants

A total of 201 community pharmacists, 200 GPs and 800 parents of eligible adolescents were included in the analysis. The demographics of the three groups of participants are described in Table 2.

Community pharmacists had a mean of 961 clients per week. Almost all community pharmacists (98%) already vaccinated in their office and 74% had a dedicated room. They were satisfied (mean note, 9.0/10) of their experience with vaccination (influenza, Covid-19). Community pharmacists were well informed about HPV vaccination recommendations, with 84% citing both girls and boys and ages 11 to 14 years.

GPs were well informed about HPV vaccination recommendations, with 88% citing girls and boys and 95% ages 11 to 14 years.

A total of 84% of parents had heard of HPV infection and 75% had heard of HPV vaccination (93% among women and 88% among parents of girls); 35% had already had one of their children between the ages of 11 and 19 vaccinated against HPV.

3.2.2. Acceptability of the extension of vaccination competencies

Acceptability of extending vaccination competencies (prescription and administration) to other HCPs was highest in community pharmacists (86% rated $\geq 7/10$) (Fig. 1).

Some factors (e.g., at least one child already vaccinated against HPV, confidence in vaccination, attitude toward vaccination) were positively correlated with parents' acceptability of extending vaccination competencies to other HCPs (Fig. 2).

In community pharmacists, acceptability was significantly correlated with a good experience of vaccination ($r = 0.344$; $p < 0.0001$), spontaneously raising the issue of HPV vaccination with their clients ($r = 0.152$; $p = 0.031$) and confidence toward vaccination ($r = 0.0182$; $p = 0.010$).

In GPs, acceptability was significantly correlated with frequent patient awareness of the issue of vaccination ($r = 0.0167$; $p = 0.018$).

3.2.3. Acceptability of the different scenarios of vaccination pathway

Four scenarios for HPV vaccination that do not yet exist involving the GP, the National Health Insurance Fund and conferring an increasing role of the community pharmacist were proposed to participants and they had to imagine themselves in these scenarios in order to evaluate them.

3.2.3.1. Favored scenarios. Pharmacists were in favor of a pathway (scenario B) where they intervene from identification of eligible adolescents to HPV vaccine injection, with an increase in their adherence in case of identification and invitation of eligible adolescents by the National Health Insurance Fund (scenario D) (Table 3). GPs favored scenario C (invitation from the National Health Insurance Fund, purchase of vaccine at pharmacy and vaccination by GP).

Forty-seven percent of parents adhered to scenario B ("all-pharmacist") with an increase in their adherence in case of identification and invitation of eligible adolescents by the National Health Insurance Fund (Table 3).

3.2.3.2. Ranking of scenarios. When community pharmacists were asked to rank the different scenarios for their ability to encourage HPV vaccination of children and adolescents, community pharmacists chose the scenarios where they vaccinated adolescents (Table 4). The "pharmacist-only" pathway only ranked third, suggesting that community pharmacists generally preferred eligible adolescents be identified by GPs or National Health Insurance Fund.

GPs preferentially ranked the two scenarios where they prescribed vaccine or vaccinated adolescents after the latter were invited by the National Health Insurance Fund (Table 4).

Parents preferentially ranked in the top two positions the scenarios involving GPs. The "pharmacist-only" pathway was ranked first by only 10% of parents.

3.2.4. Perceived benefits and barriers of the different scenarios

For community pharmacists, their preferred scenario (scenario D), in which they vaccinate adolescents invited by the National Health Insurance Fund, would simplify the vaccination pathway (94%) and consequently increase HPV vaccination coverage among adolescents (91%).

For GPs, the main advantages of their preferred scenario (Scenario C), in which they vaccinate adolescents invited by the National Health Insurance Fund, would be also the simplification of the vaccination pathway (78%) and increase of vaccination coverage (81%).

Parents considered that the main advantages of scenario A (GP prescribes and community pharmacist vaccinates) were the possibility of obtaining sufficient information on vaccination from GP (80%) and the confidence that the GP inspires as a vaccine prescriber (80%). Nevertheless,

Table 2
Demographics of participants.

	General practitioners (N = 200)	Community pharmacists (N = 201)	Parents (N = 800)
Mean age	50 years	49 years	45 years
Women	44%	51%	52%
Other characteristics	Mean practice time: 21 years	Mean practice time: 22 years	Median of 2 children 11–14 years, 62% 15–19 years, 57% Boys, 67%; girls, 52%; both, 20%

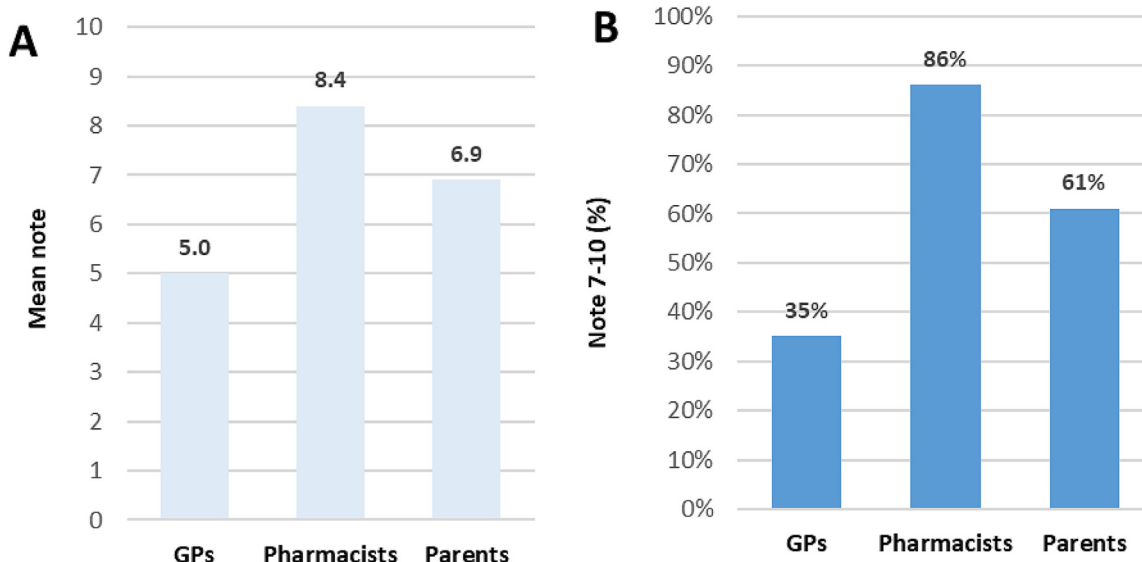


Fig. 1. Acceptability of expanding vaccination competencies to other healthcare professionals by GPs (n = 200), community pharmacists (n = 201) and parents (n = 800): (A) mean rating from 0 to 10; (B) percentages of responses with note 7–10.

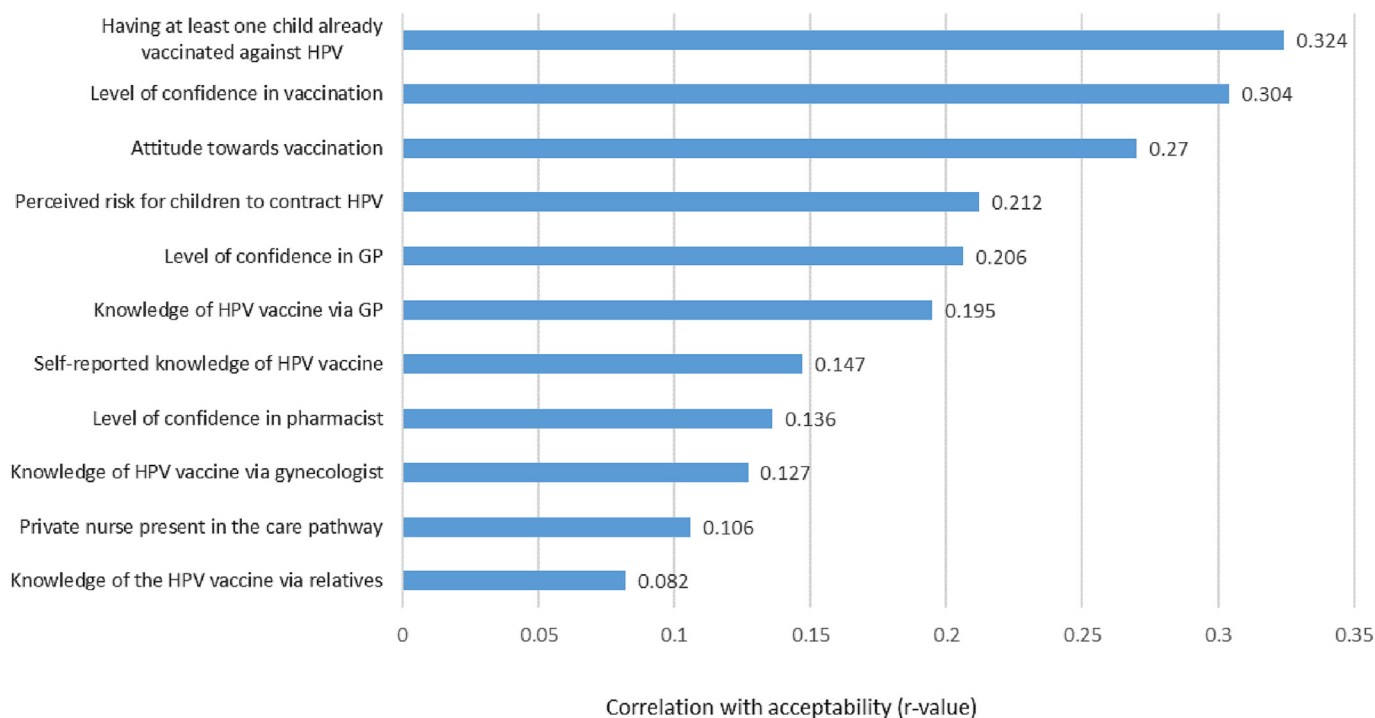


Fig. 2. Factors positively correlated with the acceptability by parents of the extension of vaccination competencies to other health professionals (listed per r-value).

a third of parents (35%) acknowledged that the disadvantage of this scenario was the frequent difficulty to get an appointment.

The scenario B (“pharmacist-only”) was at best the third most preferred vaccination pathway for the three groups of participants (Table 4). Nonetheless, both community pharmacists and parents recognized that this scenario had some advantages. Community pharmacists emphasized a short and simplified vaccination pathway because of the immediate injection (66%) and intervention of the community pharmacist who is easily accessible and more often available than the GP (62%). Some parents were also attracted by the simplicity of this vaccination pathway (38%) and the fact that there is no need for a prior appointment with the GP (40%). Among the barriers of this pathway, community pharmacists underscored the need to inform the GP of vaccination (65%) and the difficulty of identifying

the profiles of eligible subjects (44%). A majority of parents regretted that the reassuring presence of the GP if they had questions was lacking in this scenario (66%). Nevertheless, parents perceived the “all-pharmacist” scenario to be practical (78%) and to improve vaccination coverage (80%).

3.2.5. Actions proposed for facilitating HPV vaccination by community pharmacists

A total of 77% of community pharmacists considered that they needed more information on HPV vaccination (profiles of subjects eligible, benefits of HPV vaccination, risks related to HPV infection, practical details of HPV vaccine). For this purpose, community pharmacists preferred individual on-line training (44%) to face-to-face group training (31%) or online group training (15%).

Table 3
Acceptability of the projected HPV vaccination pathways resulting from the extension of vaccine competencies.

	General practitioners (N = 200)		Community pharmacists (N = 201)		Parents (N = 800)	
	Mean note ^a	Note 7–10	Mean note	Note 7–10	Mean note	Note 7–10
A	5.0	36%	7.7	76%	7.1	65%
B	3.3	18%	7.0	64%	5.9	47%
C	7.3	69%	6.4	54%	7.1	66%
D	4.1	27%	8.5	84%	6.7	59%

^a From 0 to 10.

Table 4
Ranking of the top three scenarios for vaccination pathway in the order that reflects their ability to encourage HPV vaccination of children and adolescents.

General practitioners (N = 200)		Community pharmacists (N = 201)		Parents (N = 800)	
Rank	% ^a	Rank	%	Rank	%
2 nd	25%	2 nd	30%	1 st	44%
-	-	3 rd	19%	3 rd	10%
1 st	66%	-	-	2 nd	33%
3 rd	6%	1 st	42%	3 rd	10%

^a Percentage of participants who ranked first each scenario (if one or more scenarios were considered impracticable, it could be excluded from the ranking).

Among the means and tools required to support the diversification of vaccination pathways, community pharmacists favored certain channels. Thus, the traceability of HPV vaccination through the card of the National Health Insurance Fund would be the most appropriate means (44%) according to community pharmacists compared to a digital vaccination booklet (34%) or an online vaccination platform (21%). For the second dose, a SMS reminder was the most cited method by community pharmacists (71%). Regarding communication to the general public, 83% of community pharmacists cited television as the most suitable channel (pharmacies, 53%; social networks, 44%; radio, 29%; GP offices, 28%).

4. Discussion

This survey is the first to our knowledge to explore the acceptability and expectations of GPs, community pharmacists and parents of eligible

adolescents regarding the extension of HPV vaccination competencies to community pharmacists in France. In line with the recent recommendations of the French Health Authority (HAS),^{9,10} 86% of community pharmacists, 35% of GPs and 61% of parents were in favor of the extension of vaccination competencies to other HCPs (prescription and administration).

Community pharmacists scored favorably the “pharmacist-only” pathway in which they were involved from the identification of adolescents eligible to HPV vaccine injection, with a significant increase in their approval if the identification and invitation to be vaccinated was done by the National Health Insurance Fund or, to a lesser extent, if the identification was done by the GP. We might suggest that the responsibility of prescribing the HPV vaccine to children should be supported by training for community pharmacists to make them comfortable or confident in their new role. In addition, the influenza vaccine has familiarized community pharmacists with an approach where eligible patients were invited by the National Health

Insurance Fund to purchase the vaccine, with the option of being vaccinated at the pharmacy. Community pharmacists considered that extending their competencies in terms of vaccine prescription and administration would improve HPV vaccination coverage and simplify vaccination pathway.

Community pharmacists were nevertheless mindful that their new responsibilities in HPV vaccination required gaining the confidence of parents who are faced with a new player in the vaccination of their children. To this end, they asked for more training on HPV vaccination, implementation of a traceability tool (sharing of information between community pharmacists and physicians, tracking vaccination and knowing vaccination status), support from health authorities to help them identify eligible adolescents and communication campaigns (television being the most suitable channel in their opinion).

Extending the community pharmacist's competencies to prescribe and administer vaccines to their children was moderately supported by parents. Of note, this support increased significantly with the level of confidence in vaccination, the level of knowledge about HPV vaccination and if one of their children was already vaccinated against HPV. Indeed, a majority of parents continued to identify the GP as the referent for vaccination and were in favor of pathways with the GP as prescriber or as vaccinator. Nevertheless, parents frequently acknowledged the difficulty to obtain an appointment with the GP and the greater availability of community pharmacists. Interestingly, nearly half of the parents evaluated favorably the "pharmacist-only" pathway, but it was ranked as the preferred pathway by only 10% of parents. Overall, the results in parents indicate that confidence in the HCP remains the main factor in adherence to a vaccination pathway, regardless the simplicity of the pathway.

GPs were moderately supportive of the extension of vaccination competencies to community pharmacists and had a conservative attitude by privileging scenarios where they vaccinate adolescents as is already the case. However, there is a significant correlation between a favorable rating of the extension of vaccination competencies to community pharmacists and frequent patient awareness of the issue of vaccination by GPs, even in the absence of a vaccine prescription. Although we did not investigate this point further, it seems that involvement in vaccination and health education could explain the greater or lesser support among GPs for the extension of vaccination competencies.

The scenarios that we proposed were not exclusive, but complementary. Coordination between HCPs is important to foster acceptance of the extension of new vaccination competencies. In order to increase the acceptability of the community pharmacist's role in HPV vaccination to the same level as that of the GP, the increase in confidence in the community pharmacist and HPV vaccination should benefit from a synergy between these two pathways. Confidence in the community pharmacist is a crucial point for acceptability because HPV vaccination is recommended, but not mandatory (vaccination coverage of mandatory vaccinations is very high). In addition, the community pharmacist is increasingly seen as a vaccinator through influenza and COVID-19 vaccines. Thus, about 60% of COVID-19 vaccinations have been performed in pharmacies in France.⁹ Therefore, the understanding and acceptability of the new role of community pharmacists in HPV vaccination should increase after its implementation.

In a recent systematic review conducted in the United States,¹³ six studies aimed to evaluate the pharmacist's perceived barriers to administering HPV vaccination.^{21,26–30} Besides local specificities (vaccine cost, insurance coverage and reimbursement), the main barriers to HPV vaccination were related to parental concerns, beliefs and inadequate knowledge about HPV vaccine. Community pharmacists reported their lack of information and knowledge about HPV vaccine and recommendations. In another systematic review ($n = 28$ studies), predictors of HPV vaccination acceptability in parents and adults were primarily physician recommendation, level of knowledge of HPV infection (risk perception) and HPV vaccine.³¹ In the study of Shah et al, most physicians and parents supported HPV vaccination by community pharmacists if these latter were properly trained in vaccination and ensured coordination with primary care physicians.³² Our survey confirms the key findings from these studies, especially regarding the

importance of confidence in HCPs make HPV vaccination acceptable and to guarantee the success of the new role of community pharmacists. These results will help accompanying the extension of vaccination competencies through the training of community pharmacists and communication campaigns done by healthcare authorities as well as the implementation of traceability tools to strengthen confidence in HPV vaccination.

This study has some limitations. Some of them are common to any survey, such as social desirability bias (e.g., parents of adolescents want to be seen as "good parents"). Although efforts were made to ensure that HCPs and parents were representative, participation was voluntary. It is possible that the survey participants were more interested in vaccination in general and better informed on HPV vaccination than the target population, thus introducing some possible biases. Moreover, only parents favorable to vaccination were selected. Nevertheless, 35% of parents had already had one of their children vaccinated against HPV, a rate which is close to the national VCR (37.4% for girls in 2021), thus suggesting that this sample of parents was representative. The study was conducted prior to the recent official announcement of an upcoming school-based vaccination campaign³³ and we did not test vaccination routes in this setting. Another limitation was the need for participants to imagine themselves in hypothetical scenarios not experienced in the real world, especially for the "all-pharmacist" scenario. In addition, the survey was conducted at a time when the pharmacist was not yet identified as a player in HPV vaccination, in contrast with influenza and COVID-19 vaccinations. It will therefore be interesting to repeat this survey once the extension of vaccination competences has been implemented.

5. Conclusions

Our study shows that GPs and parents, in contrast with community pharmacists, were only moderately supportive of the extension the vaccination competencies to community pharmacists. Nevertheless, when participants imagined themselves in the different vaccination pathways (scenarios), community pharmacists appeared to have a good image as healthcare professionals, but there are still some barriers among parents to recognize them as full players in the vaccination of their children or adolescents. Indeed, confidence in the care of their children, particularly concerning the prescription of vaccines, is still strongly associated with the GP. However, some of the factors identified in our survey as in other studies^{13–23} could be used as levers to overcome barriers to the acceptability of this new role for community pharmacists in HPV vaccination. These factors are the level of confidence in vaccination, perceived risk of HPV infection and knowledge of the HPV vaccine, as well as the level of confidence in the GP and community pharmacist. Training of community pharmacists and public information campaigns on HPV vaccination could strengthen confidence of parents toward this new actor in vaccination. Confidence in the HCP remains the primary factor for adherence to a vaccination program, regardless the simplicity of the pathway. Finally, extension of vaccine competencies, coordination between HCPs and synergy between pathways will impact positively HPV vaccine coverage and will support the objective of 80% VCR in 2030 to eliminate HPV related cancers.

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Ethical approval

Individual information on the study and personal rights pertaining to the data processing were provided to the participant. Consent was documented by the subject's dated signature. This study did not require patient EC review.

CRedit authorship contribution statement

Bruno Julia: Methodology, Formal analysis, Writing – review & editing. **Gaëlle Farge:** Conceptualization, Methodology, Supervision, Formal analysis, Writing – original draft, Writing – review & editing. **Benoit Mourlat:** Conceptualization, Methodology, Supervision, Formal analysis, Writing – original draft, Writing – review & editing. **Carole Mamane:** Conceptualization, Methodology, Formal analysis, Writing – review & editing. **Lionel Bensimon:** Conceptualization, Methodology, Formal analysis, Writing – review & editing. **Christophe Hommel:** Methodology, Formal analysis, Writing – review & editing. **Gilles Conan:** Methodology, Formal analysis, Writing – review & editing.

Declaration of Competing Interest

G. Farge, B. Mourlat, C. Mamane and L. Bensimon are employees of MSD France, Puteaux, France; B. Julia, C. Hommel and G. Conan report no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.rcsop.2023.100255>.

References

- Crosbie EJ, Einstein MH, Franceschi S, Kitchener HC. Human papillomavirus and cervical cancer. *Lancet* 2013;382(9895):889–899.
- de Sanjose S, Brotons M, Pavon MA. The natural history of human papillomavirus infection. *Best Pract Res Clin Obstet Gynaecol* 2018;42:7–13.
- Rosalik K, Tarney C, Han J. Human Papilloma virus vaccination. *Viruses* 2021;13:6.
- Ministère des Solidarités et de la santé. Calendrier des vaccinations et recommandations vaccinales. Avril 2022. https://solidarites-sante.gouv.fr/IMG/pdf/calendrier_vaccinal_2022_mis_a_jour_juin_2022_v2.pdf.
- Santé Publique France. Données de couverture vaccinale papillomavirus humains (HPV) par groupe d'âge. <https://www.santepubliquefrance.fr/determinants-de-sante/vaccination/articles/donnees-de-couverture-vaccinale-papillomavirus-humains-hpv-par-groupe-d-age> 2023.
- Académie Nationale de Médecine. Vaccination contre le papillomavirus humain (HPV) : la France est très en retard. 23 juin 2022. <https://www.academie-medecine.fr/wp-content/uploads/2022/06/Communique-PCRA-26-Vaccination-HPV.pdf>.
- Institut National Du Cancer. La stratégie décennale de lutte contre les cancers 2021–2030. https://solidarites-sante.gouv.fr/IMG/pdf/feuille_de_route_-_strategie_decennale_de_lutte_contre_les_cancers.pdf 2021.
- World Health Organization. Global strategy to accelerate the elimination of cervical cancer as a public health problem. 17 November 2020. <https://www.who.int/initiatives/cervical-cancer-elimination-initiative>.
- Haute Autorité de Santé. Élargissement des compétences en matière de vaccination des infirmiers, des pharmaciens et des sages-femmes chez les adolescents de plus de 16 ans et les adultes. 23 juin 2022. https://www.has-sante.fr/jcms/p_3312462/fr/elargissement-des-competences-en-matiere-de-vaccination-des-infirmiers-des-pharmaciens-et-des-sages-femmes-chez-les-adolescents-de-plus-de-16-ans-et-les-adultes.
- Haute Autorité de Santé. Élargissement des compétences en matière de vaccination des infirmiers, des pharmaciens et des sages-femmes chez les enfants et adolescents de moins de 16 ans. 23 juin 2022. https://www.has-sante.fr/jcms/p_3335030/fr/elargissement-des-competences-en-matiere-de-vaccination-des-infirmiers-des-pharmaciens-et-des-sages-femmes-chez-les-enfants-et-adolescents-de-moins-de-16-ans.
- Auvray L, Le Fur-Mars P. Adolescents: état de santé et recours aux soins. *Bulletin d'Information en Economie de la Santé* 2002;49:1–6.
- International Pharmaceutical Federation (FIP). *FIP global vaccination advocacy toolkit: supporting and expanding immunisation coverage through pharmacists*. The Hague: International Pharmaceutical Federation. 2019. <https://ipapharma.org/wp-content/uploads/2020/09/FIP-VaccinationToolkit.pdf>.
- Oyedede O, Maples JM, Gregory S, et al. Pharmacists' perceived barriers to human papillomavirus (HPV) vaccination: a systematic literature review. *Vaccines (Basel)* 2021;9(11).
- Calo WA, Shah PD, Gilkey MB, et al. Implementing pharmacy-located HPV vaccination: findings from pilot projects in five U.S. states. *Hum Vaccin Immunother* 2019;15(7–8):1831–1838.
- Jimenez-Quinones EM, Melin K, Jimenez-Ramirez 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.
- Kessels SJ, Marshall HS, Watson M, Braunack-Mayer AJ, Reuzel R, Tooher RL. Factors associated with HPV vaccine uptake in teenage girls: a systematic review. *Vaccine* 2012;30(24):3546–3556.
- Kester LM, Shedd-Steele RB, Dotson-Roberts CA, Smith J, Zimet GD. The effects of a brief educational intervention on human papillomavirus knowledge and intention to initiate HPV vaccination in 18–26 year old young adults. *Gynecol Oncol* 2014;132 Suppl 1S9–12.
- Caskey R, Lindau ST, Alexander GC. Knowledge and early adoption of the HPV vaccine among girls and young women: results of a national survey. *J Adolesc Health* 2009;45(5):453–462.
- Holman DM, Benard V, Roland KB, Watson M, Liddon N, Stokley S. Barriers to human papillomavirus vaccination among US adolescents: a systematic review of the literature. *JAMA Pediatr* 2014;168(1):76–82.
- Gerend MA, Weibley E, Bland H. Parental response to human papillomavirus vaccine availability: uptake and intentions. *J Adolesc Health* 2009;45(5):528–531.
- 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;17E23.
- 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(9):801–814.
- 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):313–321.
- Shen AK, Peterson A. The pharmacist and pharmacy have evolved to become more than the corner drugstore: a win for vaccinations and public health. *Hum Vaccin Immunother* 2020;16(5):1178–1180.
- Ordre National des Pharmaciens. Démographie des pharmaciens. Panorama au 1^{er} janvier. <https://www.ordre.pharmacien.fr/content/download/554591/2566427/version/4/fichier/Brochure+de+la+d%C3%A9mographie+pharmaceutique+compl%C3%A8te+au+1er+janvier+2021.pdf> 2001.
- Hastings TJ, Hohmann LA, McFarland SJ, Teeter BS, Westrick SC. Pharmacists' attitudes and perceived barriers to human papillomavirus (HPV) vaccination services. *Pharmacy (Basel)* 2017;5(3).
- Berce PC, Bernstein RS, MacKinnon GE, et al. Immunizations at Wisconsin pharmacies: results of a statewide vaccine registry analysis and pharmacist survey. *Vaccine* 2020;38(28):4448–4456.
- Islam JY, Gruber JF, Kepka D, et al. Pharmacist insights into adolescent human papillomavirus vaccination provision in the United States. *Hum Vaccin Immunother* 2019;15(7–8):1839–1850.
- Skiles MP, Cai J, English A, Ford CA. Retail pharmacies and adolescent vaccination—an exploration of current issues. *J Adolesc Health* 2011;48(6):630–632.
- 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 (2003)* 2018;58(4S):S16–S23.
- Brewer NT, Fazekas KL. Predictors of HPV vaccine acceptability: a theory-informed, systematic review. *Prev Med* 2007;45(2–3):107–114.
- 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):970–978.
- Leclercq A. *Une campagne de vaccination gratuite contre les HPV au collège dès la rentrée*. Medscape French Edition. March 1, 2023, <https://français.medscape.com/voirarticle/3609770>.