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ORIGINAL ARTICLE

Practices and opinions regarding HPV vaccination among French general practitioners: evaluation through two cross-sectional studies in 2007 and 2010

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Abstract
Objectives To use both quantitative and qualitative methods to investigate the evolution of practices and opinions regarding human papillomavirus (HPV) vaccination among French general practitioners.
Methods A cross-sectional study (self-questionnaires) was performed in 2007 and repeated in 2010 among 271 general practitioners. Semi-structured interviews were conducted on 27 voluntary participants by a sociologist and analyzed according to content analysis.
Results Acceptability of HPV vaccination had increased from 2007 to 2010 (79.9 vs. 87.1 %, respectively), just as the practice of HPV vaccination among 14-year-old girls (19.0 vs. 49.1 %, respectively). Though about 60 % reported complications associated with HPV vaccination, irrespective of year, the types of difficulties have varied: difficulties related to "questions asked by patients" had decreased, though concerns about side effects had remained stable. During interviews, difficulties related to "the reason for medical consultation" and "the target age" were often associated with addressing the issue of sexuality, especially when the parents were present.
Conclusions Although the high level of acceptability of HPV vaccination among general practitioners, which increased from 2007 to 2010, there remain difficulties in addressing this practice.

Keywords HPV vaccination · General practitioner · Practice · Opinion · Attitude · Evolution

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Introduction

Cervical cancer was the second most frequent cancer in women worldwide in 2008 with 530,000 cases (Ferlay et al. 2011) and was the twelfth most common cancer in women in France with an estimated 2,810 new cases in 2011 (Institut de Veille Sanitaire 2012). Pap smear screening is the initial method used for identification of cervical cancer. Also, HPV vaccination has existed since 2007 as a means to prevent human papillomavirus (HPV) infection, which is the causative agent of cervical cancer (Munoz et al. 2003). The vaccine protects against HPV genotypes 16 and 18, which are responsible for 70 % of cervical cancer. In addition, the quadrivalent vaccine protects against 90 % of genital warts, as it also contains HPV genotypes 6 and 11. It was shown that HPV vaccination would be a cost-effective policy option in France (Demarteau et al. 2011). At the time of the survey, HPV vaccination was recommended in France for 14-year-old girl and those of 15–23 years old if they are not sexually active or if they have less than a 1-year history of sexual

activity. In addition, French recommendations for HPV vaccination require that mention of cervical cancer screening must accompany discussion of the vaccine and that efforts to promote condom use must be continued (Haut Conseil de la santé publique 2011).

A 4-year retrospective clinical trial identified very good efficacy of HPV vaccination (Lu et al. 2011). Moreover, studies of effectiveness performed in Australia have shown a significant decrease in both the incidence of high-grade cytological abnormalities and genital warts in vaccinated women (Brotherton et al. 2011). In addition, vaccination has reduced the rate of genital warts in heterosexual non-vaccinated men (Donovan et al. 2011). Collectively, these results are promising regarding the possibility for a future decrease in the incidence of cervical cancer.

However, in order to maximize effectiveness of the HPV vaccine, to reduce circulation of the virus, and to obtain herd protection, high HPV vaccination coverage is required. In Australia, UK, and Portugal, school-based and/or national public health programs regarding HPV were implemented, which rapidly resulted in 80 % vaccine coverage (Agius et al. 2010; Forster et al. 2010; Dorleans et al. 2010). In France, in 2010, 38.7, 50.0, and 52.6 % of girls aged 15, 16, and 17 had received at least one dose of the HPV vaccine, respectively (Haut Conseil de la santé publique 2011).

However, in France, there are no school-based programs, and although reimbursed, HPV vaccination depends on the private sector, especially on the efforts of general practitioners. They are essential in the decision-making process for vaccination. Their advice is crucial in avoiding misconceptions among undecided mothers, in reassuring them, explaining benefits of the vaccination, and in answering their questions. Some authors showed and discussed the fact that the principal information source that mothers trust is their physician (Haesebaert et al. 2012). As a result, it is very important to study their opinions, attitudes, and beliefs in relation to HPV vaccination in order to highlight any difficulties that might restrain their use of the vaccine (Perkins and Clark 2012).

Three years after licensing of the HPV vaccine, general practitioners may be more likely to promote, discuss, and/or practice HPV vaccination. Nevertheless, in order to gain a greater understanding of factors contributing to the coverage of HPV vaccination and to increase its delivery, it is necessary to study the evolution in opinions, practices, and difficulties encountered by general practitioners. Few studies regarding views of healthcare workers in relation to HPV vaccination have been undertaken in Europe since licensing of the vaccine (Lutringer-Magnin et al. 2011; Hopkins et al. 2009; Pélissier and Bastides 2008; Piana et al. 2009). Thus, investigating this topic is a priority for the European Centre for Disease Prevention and Control (2012). Moreover, to our knowledge, there has not been a repeated study enabling investigation of the evolution in opinion and practice of healthcare workers within the same geographical area.

The first objective of our work was to use both quantitative and qualitative methods to study the evolution of opinions, practices, and difficulties associated with HPV vaccination among general practitioners working in the Rhône-Alpes region of France between 2007 and 2010. Our second objective was to investigate the opinions of general practitioners regarding opportunities and inconveniences related to HPV vaccination in 2010.

Methods

Study design

We published a previous cross-sectional study related to healthcare workers and HPV vaccination, which was conducted between November 2007 and April 2008 (Lutringer-Magnin et al. 2011). Here, we describe the repeat of that study conducted between May and October 2010 in an unpaired representative sample of general practitioners practicing in the Rhône-Alpes region, which contains 6 million inhabitants and 8 departments, representing about 10 % of France.

As in the initial study, we used in 2010 a mixed method research, which combined quantitative and qualitative approaches to explore recent opinions and practice of general practitioners. In the results part, quantitative results of both studies (2007 and 2010) were compared in order to study evolution in the views of healthcare workers on HPV vaccination, but only 2010s results are new. The qualitative approach was based on an explanatory design as defined by Creswell and Plano Clark (2007). Qualitative data help to explain initial quantitative results.

Population

The participating general practitioners in 2007 were selected from 5,973 GPs practicing in the Rhône-Alpes region. In addition, in order to study two unpaired samples of general practitioners, those who had already participated in 2007 and were still working in the Rhône-Alpes region in 2010 (266) were excluded. Therefore, general practitioners participating in 2010 were selected from a total of 5,558 general practitioners practicing in the Rhône-Alpes region in January 2010. For both years, a 5 % quota sampling was performed according to gender, department, and the nature of the area in which the general practitioner practiced (urban, suburban, or rural). Finally, the target numbers of general practitioners to include were 299 in

2007 and 290 in 2010. The target number calculation and method of quota sampling were described in a previous article (Lutringer-Magnin et al. 2011).

Data collection

The same self-questionnaire was completed by the two unpaired samples of general practitioners in 2007 and 2010. The data collected included: (1) general information (age, gender, time of practice, acupuncture/homeopathy practice, and Pap test practice); (2) opinion about HPV vaccination (general practitioners were asked if they were favorable, uncertain, or opposed to HPV vaccination and to justify their opinion in an open-ended question); (3) practice about HPV vaccination (number of HPV vaccinations performed in the month preceding the survey and frequency of routine practice of HPV vaccination according to age of patient); (4) difficulties encountered (closed questions); (5) opinions regarding possible opportunities and inconveniences created by HPV vaccination (closed questions, which were asked only during the 2010 survey).

Analysis

The evolution in opinion and practice from 2007 and 2010 was determined by analysis of both unpaired samples of general practitioners using Chi-squared or Fisher's exact test and odds ratios (95 % confidence interval) for qualitative variables, and a Student's t test for quantitative variables. Opinions about opportunities or inconveniences that HPV vaccination may create were reported by stratifying general practitioners' responses: favorable versus unfavorable. Due to the small number of opposed general practitioners, they were combined with those that were uncertain. A P value < 0.05 was considered as significant.

Semi-structured interviews

General practitioners who agreed to participate in the quantitative study were also asked whether they were willing to be interviewed by a sociologist (master's degree). Among the 106 volunteers in 2010, 27 general practitioners who fulfilled criteria for the qualitative study [already described (Lutringer-Magnin et al. 2011)] were interviewed in their offices. The 60–80 min semi-structured interviews were guided by a schedule informed by the themes addressed in the quantitative part of the study and designed to explore in greater depth the opinions and difficulties and their reported changes between 2007 and 2010. They were recorded by audiotape and transcribed verbatim. The results were then analyzed and compared according to the methodology proposed by Miles and Huberman (2003) using NVivo software (QSR International). Briefly, data were first coded by the sociologist according to the themes of the questionnaire. Each theme was then analyzed according to the analytical methodology comparative content. Themes were discussed and agreed upon by the steering group, including another sociologist (PhD) member of the research team who read a sample of the transcripts.

Results

Characteristics of the general practitioners in 2010

As can be seen in Table 1, 271 general practitioners were included in 2010. This figure represented 93.4 % of the target numbers for participants. No differences were observed between characteristics of general practitioners included in 2010 and general practitioners of the whole Rhône-Alpes region of France. Although general practitioners included in 2010 were more likely to practice homeopathy or acupuncture compared with those included in 2007 (11.8 vs. 3.6 %, $P < 0.001$), there were no differences observed regarding sociodemographic characteristics, time of installation, or practice of the Pap test. Also, the characteristics of the 27 general practitioners interviewed are presented in Table 1.

Evolution of opinion and practice regarding HPV vaccination between 2007 and 2010

Opinion regarding HPV vaccination

Quantitative results During the 3-year period between the two studies, uncertain opinions regarding HPV vaccination in general practitioners showed a decrease (17.2 % in 2007 vs. 10.0 % in 2010), and favorable opinions were significantly increased (79.9 % in 2007 vs. 87.1 % in 2010, $P = 0.04$). Those opposed to HPV vaccination remained stable (about 2.0 %) (Table 2). The benefit of HPV vaccination on public health was the main justification given by general practitioners for a favorable opinion in 2010, but the rate of this view had increased between the studies (43.0 % in 2007 vs. 52.5 % in 2010). As in 2007, the good efficacy of the vaccine was the second most frequent justification given in 2010 (14.0 %). Regarding uncertain general practitioners, the fact that the vaccine was only recently developed was the main justification for their opinion in 2010 (40.7 %), which is a finding that remained stable between both studies. Excess marketing was the only justification that increased for this group (6.3 % in 2007 vs. 18.5 % in 2010) (Table 2).

Qualitative results Among the 17 favorable general practitioners interviewed in 2010, some of them explained

Table 1 Characteristics of general practitioners (GPs) according to the year of study, of those of the region Rhône-Alpes (RA) in 2010, and of GPs interviewed in 2010, 2007–2010, France

	2007–08 $N = 279$	2010 $N = 271$	P value[a]	Population of GPs in RA in 2010 $N = 5,558$	P value[b]	Interviewed GPs in 2010 $N = 27$
Practice area			0.89		0.95	
Rural	57 (20.4)	51 (18.8 %)		1,019 (18.3 %)		4
Suburban	32 (11.5)	32 (11.8 %)		632 (11.4 %)		4
Urban	190 (68.3)	188 (69.4 %)		3,907 (70.3 %)		19
Gender			0.69		0.37	
Male	194 (69.5)	184 (67.9 %)		3,914 (70.4 %)		15
Female	85 (30.5 %)	87 (32.1 %)		1,644 (29.6 %)		12
Departments			0.99		0.98	
1	18 (6.5)	21 (7.8 %)		392 (7.1 %)		1
2	17 (6.1)	14 (5.2 %)		290 (5.2 %)		3
3	23 (8.3)	18 (6.6 %)		436 (7.8 %)		2
4	57 (20.5)	54 (19.9 %)		1,091 (19.6 %)		5
5	35 (12.6)	35 (12.9 %)		706 (12.7 %)		6
6	72 (25.9)	72 (26.6 %)		1,545 (27.8 %)		6
7	23 (8.3)	25 (9.2 %)		427 (7.7 %)		2
8	34 (12.2)	32 (11.8 %)		671 (12.1 %)		2
Age in years (mean, SD)	50.4 (7.7)	51.6 (7.7)	0.07	–		52.5
Time of installation in years (mean, SD)	20.2 (8.7)	21.3 (8.8)	0.15	–		
Acupuncture/homeopathy practice			<0.001	–		
Yes	10 (3.6 %)	32 (11.8 %)				7
No	269 (96.4 %)	238 (87.8 %)				20
Missing data	0 (0.0 %)	1 (0.4 %)				
Performed Pap test during the month preceding the survey			0.10	–		
Yes	206 (73.8 %)	185 (68.3 %)				23
No	70 (25.1 %)	86 (31.7 %)				4
Missing data	3 (1.1 %)	0 (0.0 %)				

[a] P value comparing both samples of GPs

[b] P value comparing sample of general practitioners of 2010 and overall general practitioners of Rhône-Alpes

that they were uncertain about HPV vaccination in 2007, but had gained a favorable opinion based on new knowledge related to the efficacy and side effects of HPV vaccination. They reported that in addition to the effects of HPV vaccination on public health, the novelty of the vaccine in medicine influenced their decision: "*it is very interesting that we can reduce the morbidity of cervical cancer through vaccination (…) it is very pioneering*". Nevertheless, some of them were more careful regarding immunity or protection: "*This vaccine is still new, we do not know exactly how long the immunity will last, and it only protects against 70 % of cervical cancers*".

Practice of HPV vaccination

In 2010, 82.7 % of general practitioners reported to have delivered HPV vaccinations during the month preceding the survey and 49.1 % said having frequently vaccinated 14-year-old girls. These figures were higher compared with the previous study (75.6 and 19.0 %, respectively) (Table 3). However, there was no difference reported for the 15–23-year-old group, with about 67.0 % of general practitioners reporting frequent vaccination of them in both studies. Moreover, in 2010, 81.7 and 94.2 % of general practitioners reported having frequently discussed cervical cancer screening with 14- and 15–23-year-old girls, respectively, when performing vaccination. The figures corresponding to sexually transmitted infections (STIs) topic were 73.6 and 79.4 %. No difference existed between 2007 and 2010 (Table 3).

Difficulties encountered in addressing HPV vaccination

Quantitative results A total of 56.7 % of general practitioners reported at least one complication related to

Table 2 Opinion about human papillomavirus (HPV) vaccination according to the year of study, 2007–2010, France

	2007–08 $N = 279$	2010 $N = 271$	P value
Opinion about HPV vaccination			0.04
Favorable	223 (79.9 %)	236 (87.1 %)	
Uncertain	48 (17.2 %)	27 (10.0 %)	
Opposed	5 (1.8 %)	6 (2.2 %)	
Missing data	3 (1.1 %)	2 (0.7 %)	
Main justifications of favorable GPs[a]	$N = 223$	$N = 236$	
Beneficial effects of vaccine on public health and its role in primary prevention	96 (43.0 %)	124 (52.5 %)	0.04
Good efficacy of vaccine	33 (14.8 %)	33 (14.0 %)	0.80
Frequency/gravity of cervical lesions or dysplasia	20 (9.0 %)	28 (11.9)	0.31
Expert advice	2 (0.9 %)	10 (4.2)	0.04
Absence of side effects	9 (4.0 %)	18 (7.6)	0.10
Advances of medicine	15 (6.7 %)	6 (2.5)	0.03
Positive opinion about vaccination in general	3 (1.3 %)	3 (1.3 %)	1
Other	6 (2.7 %)	4 (1.7 %)	0.53
Missing data	63 (28.3 %)	49 (20.8 %)	0.08
Main justifications of uncertain GPs[a]	$N = 48$	$N = 27$	
Vaccine too recently introduced	21 (43.8 %)	11 (40.7 %)	0.80
Need to continue Pap test	5 (10.4 %)	6 (22.2 %)	0.19
Lack of information	4 (8.3 %)	2 (7.4 %)	1
Generally wait and see with recent vaccine	4 (8.3 %)	1 (3.7 %)	0.65
Too much marketing	3 (6.3 %)	5 (18.5 %)	0.02
Bad experience with hepatitis B vaccine	2 (4.2 %)	1 (3.7 %)	1
Cervical screening is sufficient and need to be stable	1 (2.1 %)	2 (7.4 %)	0.29
Other	2 (4.2 %)	4 (14.8 %)	0.18
Missing data	11 (22.9 %)	2 (7.4 %)	0.12
Main justifications of opposed GPs[a]	$N = 5$	$N = 6$	
Vaccine too recently introduced	2 (40.0 %)	2 (33.3 %)	1
Pap test is sufficient to prevent CC	2 (40.0 %)	0 (0.0 %)	0.18
Other	2 (40.0 %)	2 (33.3 %)	1
Missing data	0 (0.0 %)	2 (33.3 %)	0.45

[a] Non-exclusive data, open-ended questions

addressing HPV vaccination with girls in 2010. This figure remained stable since 2007 (Table 4). However, the types of difficulties have varied. Indeed, "questions asked by patients", which was the main difficulty in 2007 had significantly decreased by 2010 (37.0 % in 2007 vs. 25.4 % in 2010, $P = 0.009$). Conversely, difficulties related to "the reason for medical consultation" had significantly increased (17.5 % in 2007 vs. 33.9 % in 2010, $P < 0.001$), becoming the main complication in 2010. "The target age for vaccination" was reported as a difficult subject by about 27.0 % of general practitioners, irrespective of the year. Finally, although "the necessity to address STIs issue" was identified as the last problem encountered by general practitioners in both studies, it had significantly increased (6.2 % in 2007 vs. 13.4 % in 2010, $P = 0.01$).

Qualitative results During interviews, general practitioners explained that there was reduced difficulty related to "the questions asked by patients" due to the amount of information they had received about the vaccine from 2007 to 2010, helping them to answer the parental questions. The only concern that remained was related to side effects, which were difficult to address with reassurance. This fear of side effects was difficult for general practitioners to understand: "*When we ask them what they are afraid of, they don't know. It's fear of the novelty, fear of being sick, just fear….*" As in 2007, general practitioners referred in 2010 to vaccination against hepatitis B: "*there has still been many reluctances since the hepatitis B vaccination history*". In addition, there was reference to the vaccination against influenza A(H1N1)pdm09 in 2010: "*Difficulties with the influenza A vaccine sparked a controversy, each physician had his own opinion about this vaccination and asked him/herself a lot of questions about it. As a result, people transferred these doubts on all vaccines*". Regarding other difficulties, addressing the issue of sexuality, especially in the presence of the parents, was often reported by general practitioners. In particular, this was related to "addressing STIs issue", "initial reason for consulting," and "the target age". To avoid this difficulty, one general practitioner suggested that: "*It would be better at 10–12 years of age, at the same time as the diphtheria–tetanus–poliomyelitis immunization. Because talking about sexuality to a 14-year-old girl means mentioning her future sexual life. Mothers are reluctant to talk about that and I think it is better to let them remain naive for a little while*". Other general practitioners thought that an older age would be more appropriate.

Opinions in 2010 regarding opportunities or inconveniences related to HPV vaccination

As shown in Table 5, more than 90 % of general practitioners, especially those favoring HPV vaccination, agreed that the time of HPV vaccination represented a valuable opportunity for addressing the prevention of STIs and Pap smear screening issues with girls, as well to address Pap

Table 3 Human papillomavirus (HPV) vaccination practice according to the year of study, 2007–2010, France

	2007–08 $N = 279$	2010 $N = 271$	P value	OR (95 % CI)[a]
At least one HPV vaccination performed during the month preceding the survey			0.06	
Yes	211 (75.6 %)	224 (82.7 %)		1.5 (1–2.3)
No	66 (23.7)	47 (17.3 %)		1
Missing data	2 (0.7 %)	0 (0.0 %)		–
Vaccinations performed according to girls' age during the month preceding the survey (mean, SD)				
(Among GPs' who performed at least one injection)	$N = 211$	$N = 224$		
Total vaccinations	4.97 (4.16)	5.25 (5.44)	0.85	
Vaccinations in girls aged <14	0.31 (0.84)	0.22 (0.71)	0.21	
Vaccinations in girls aged 14	1.54 (1.98)	1.48 (1.88)	0.77	
Vaccinations in girls aged 15–23	3.04 (2.89)	3.46 (3.88)	0.21	
Vaccinations in girls aged more than 23	0.13 (0.42)	0.10 (0.55)	0.46	
Regarding girls aged 14				
Generally speaking, how frequently you practice HPV vaccination?	$N = 279$	$N = 271$	<0.001	
Frequently	53 (19.0 %)	133 (49.1 %)		4.0 (2.7–5.8)
Rarely	212 (76.0 %)	134 (49.4 %)		1
Missing data	14 (5.0 %)	4 (1.5 %)		–
How frequently you have discussed about Pap smear screening when you have practiced HPV vaccination?				
(Among GPs' who performed at least one injection in girls aged 14 during the month preceding the survey)	$N = 130$[b]	$N = 148$[b]	0.78	
Frequently	104 (83.2 %)	67 (81.7 %)		0.9 (0.4–1.9)
Rarely	21 (16.6 %)	15 (18.3 %)		1
Missing data	5	66		–
How frequently you have discussed about STI prevention when you have practiced HPV vaccination?	$N = 130$	$N = 148$	0.56	
Frequently	99 (76.2 %)	109 (73.6 %)		0.8 (0.5–1.5)
Rarely	26 (20.0 %)	34 (23.0 %)		1
Missing data	5 (3.9 %)	5 (3.3 %)		–
Regarding girls aged 15–23				
Generally speaking, how frequently you practice HPV vaccination?	$N = 279$	$N = 271$	0.80	
Frequently	187 (67.0 %)	185 (68.3 %)		1.0 (0.7–1.4)
Rarely	78 (28.0 %)	81 (29.9 %)		1
Missing data	14 (5.0 %)	5 (1.8 %)		–
How frequently you have discussed about Pap smear screening when you have practiced HPV vaccination?				
(Among GPs' who performed at least one injection in girls aged 15–23 during the month preceding the survey)	$N = 184$[b]	$N = 209$[b]	0.95	
Frequently	167 (94.4 %)	113 (94.2 %)		1.0 (0.4–2.6)
Rarely	10 (5.6 %)	7 (5.8 %)		1
Missing data	7	89		–
How frequently you have discussed about STI prevention when you have practiced HPV vaccination?	$N = 184$	$N = 209$	0.61	
Frequently	152 (82.6 %)	166 (79.4 %)		0.9 (0.5–1.5)
Rarely	27 (14.7 %)	34 (16.3 %)		1
Missing data	5 (2.7 %)	9 (4.3 %)		–

[a] Odds ratios and their 95 % confidence interval (interpretation: 2010 vs. 2007–08)

[b] Percentages were calculated without considering the missing data

smear screening issues with mothers. Only 26.1 and 9.0 %, especially those unfavorable to HPV vaccination, thought that vaccination might lead to reduced condom use or give girls a bad view of sexuality, respectively. Finally, 29.5 % thought that vaccination might lead to an increase in Pap testing by general practitioners.

Table 4 Reported difficulties in providing human papillomavirus (HPV) vaccination among general practitioners having practiced it during the month preceding the survey according to the year of study, 2007–2010, France

[a] Odds ratios and their 95 % confidence interval (interpretation: 2010 vs. 2007–08)

	2007–08 $N = 211$	2010 $N = 224$	P value	OR (95 % CI)[a]
Reported difficulties in providing vaccination				
Yes	133 (63.0 %)	127 (56.7 %)	0.18	0.8 (0.5–1.1)
No	78 (37.0 %)	97 (43.3 %)		1
Type of difficulties in providing vaccination				
Questions asked by patients	78 (37.0 %)	57 (25.4 %)	0.009	0.6 (0.4–0.9)
Targeted age for vaccination	61 (28.9 %)	59 (26.3 %)	0.55	0.9 (0.6–1.3)
Reason for medical consultation	37 (17.5 %)	76 (33.9 %)	<0.001	2.4 (1.5–3.8)
Necessity to address STIs issue	13 (6.2 %)	30 (13.4 %)	0.01	2.4 (1.2–4.7)

Table 5 General practitioners' opinions regarding opportunities/inconveniences of human papillomavirus (HPV) vaccination during 2010s study according to their vaccination opinion, 2010, France

[a] Uncertain and opposed general practitioners

	Favorable $N = 236$	Unfavorable[a] $N = 33$	Total $N = 269$
It is an opportunity to address STI issue with girls			
Agreed	219 (92.8 %)	26 (78.8 %)	245 (91.4 %)
Did not agree	14 (5.9 %)	7 (21.2 %)	21 (7.8 %)
Missing data	3 (1.3 %)	0 (0.0 %)	3 (1.1 %)
It is an opportunity to address Pap smear screening with girls			
Agreed	225 (95.3 %)	28 (84.8 %)	253 (94.4 %)
Did not agree	8 (3.4 %)	5 (15.2 %)	13 (4.9 %)
Missing data	3 (1.3 %)	0 (0.0 %)	3 (1.1 %)
It is an opportunity to address Pap smear screening with mothers			
Agreed	223 (94.5 %)	28 (84.8 %)	251 (93.7 %)
Did not agree	11 (4.7 %)	4 (12.1 %)	15 (5.6 %)
Missing data	2 (0.8 %)	1 (3.0 %)	3 (1.1 %)
It may lead to a lower use of condoms			
Agreed	54 (22.9 %)	16 (48.5 %)	70 (26.1 %)
Did not agree	177 (75.0 %)	16 (48.5 %)	193 (72.0 %)
Missing data	5 (2.1 %)	1 (3.0 %)	6 (2.2 %)
It may give girls a bad picture of sexuality			
Agreed	17 (7.2 %)	7 (21.2 %)	24 (9.0 %)
Did not agree	216 (91.5 %)	26 (78.8 %)	242 (90.3 %)
Missing data	3 (1.3 %)	0 (0.0 %)	3 (1.1 %)
It could lead GPs to practice more Pap tests			
Agreed	71 (30.1 %)	8 (24.2 %)	79 (29.5 %)
Did not agree	155 (65.7 %)	24 (72.7 %)	179 (66.8 %)
Missing data	10 (4.2 %)	1 (3.0 %)	11 (4.1 %)

Discussion

Opinion of general practitioners

Our objective was to study the evolution in opinions, practices, and difficulties regarding HPV vaccination among general practitioners working in the Rhône-Alpes region of France. We found that acceptability of HPV vaccination has remained high and had increased from 2007 (when the vaccine was licensed) to 2010, when 87 % of general practitioners were in favor of HPV vaccination. Notably, all authors who have studied acceptability of HPV vaccination by healthcare providers since licensing of the vaccine have found similar results (Hopkins et al. 2009; Pélissier and Bastides 2008; Piana et al. 2009; Ko et al. 2010; Jensen et al. 2009; Daley et al. 2010; Post et al. 2013; Young et al. 2011). According to our qualitative results, new knowledge and the amount of information regarding efficacy and side effects of HPV vaccination may explain that uncertain general practitioners in 2007 became favorable in 2010. Given that the French HPV vaccination program depends on the private sector, especially on the efforts of general practitioners, this result may be reassuring. However, parents play an important role in the

decision-making process as well, and general practitioners recommendations might not to be sufficient to convince them of the benefits of vaccination (Darden et al. 2013).

Practice of general practitioners

Despite the collective favorable opinion of general practitioners, their practice of vaccination remained weak. Although they were more likely to perform injections during the month preceding the survey in 2010 compared with 2007 (83 vs. 76 %), the number of vaccinations performed by each GP remained similar. In regard to their routine practice, even though the figure had increased from 2007, only half of general practitioners in 2010 reported frequent HPV vaccination to 14-year-old girls. Our results were consistent with the insufficient French HPV vaccination coverage in 2010 when 38.7 % of 15-year-old girls and 52.6 % of those aged 17 had received at least one dose of the HPV vaccine (Haut Conseil de la santé publique 2011). This weak practice of HPV vaccination may be partially explained by uncertain or opposed general practitioners, who might not promote HPV vaccination. In our study, their main fear was that the vaccine had only recently been developed, a finding that is supported by concerns over side effects by healthcare providers (Perkins and Clark 2012; De Carvalho et al. 2009). This weak practice may also be explained by difficulties encountered by general practitioners. Indeed, 56.7 % of them who had delivered HPV vaccine during the month preceding the survey in 2010 reported difficulties in addressing HPV vaccination, and this finding was similar to what was observed in 2007. Notably, the difficulty related to "the reason for medical consultation" had significantly increased from 2007, becoming the main difficulty in 2010. The novelty of the vaccine and its large media coverage might have led girls to discuss the vaccine with their general practitioners in 2007, irrespective of their reasons for visiting. Therefore, given the decreased media coverage, there is probably reduced demand for the vaccine, and general practitioners may need to actively promote HPV vaccination. Another explanation could be the decrease in age of vaccinated girls between 2007 and 2010. In 2007, during the catch up period, many 16–20-year-old girls were vaccinated. In 2010, most of the girls eligible for vaccine were probably young adolescents (14–15) visiting doctor with their parents for another reason. This may have resulted in specific difficulties to address HPV vaccination. As shown by qualitative results, it might be difficult for general practitioners to address STI-related vaccination, especially in front of parents, in a context when the reason for consultation was completely different. Although complications related to "questions asked by patients" have decreased, one-quarter of general practitioners still reported this difficulty in 2010. Moreover, our qualitative study showed that these difficulties were primarily associated with questions about side effects, which remained stable, and were hard to resolve. This difficulty reported by general practitioners has been identified in many studies regarding HPV vaccination (McCave 2010; Marlow et al. 2009; Kahn et al. 2009; Jim et al. 2012; Wong 2011; Vadaparampil et al. 2011), as well as vaccination in general (Leib et al. 2011; Kempe et al. 2011). Indeed, there was generally high acceptance of the vaccine by parents even though they often cited the fear of side effects as an issue when deciding whether or not to vaccinate their girls (Trim et al. 2012; Haesebaert et al. 2012; Schnatz et al. 2010; Remes et al. 2012; Darden et al. 2013), and this concern might grow as time passes (Darden et al. 2013). Finally, addressing the issue of sexuality, especially in the presence of parents, might also explain difficulties related to "target age of HPV vaccination", which was reported as a complication by one-quarter of general practitioners. This difficulty was found in both of our studies and has been confirmed by another report (Krupp et al. 2010). Nevertheless, we observed that only 13 % of general practitioners reported difficulties linked to "addressing STI prevention", more than 90 % of general practitioners reported in 2010 that HPV vaccination presented an opportunity to address STI issues, and about three-quarters reported that they had addressed the topic of STIs when vaccinating patients. As a result, the complications related to target age and discussing sexuality might be more related to the presence of parents than to the specific issue at hand.

How to increase coverage of HPV vaccination in France?

Coverage of HPV vaccination is low in France as 52.6 % of girls aged 17 had received at least one dose of the HPV vaccine (Haut Conseil de la santé publique 2011). Our results and our discussion suggest that this may be due to the difficulties encountered by general practitioners, even those in favor of the vaccine, as previously reported by others (Ko et al. 2010). To avoid these difficulties and improve coverage, the recommended target age of 14 years old could be modified. As an older age is not relevant because injections must precede the first sexual experience, an 11–12-year-old target age might be more appropriate. This would enable general practitioners to achieve vaccination more easily in the target population because of a recommended booster dose of diphtheria–tetanus–poliomyelitis at that time and to prevent of difficulties related to addressing sexuality issues in front of parents.

Through examination of HPV vaccination practices in the literature (irrespective of our results), we noted that coverage

was >60 % in countries where a vaccination program is organized (i.e., Switzerland) (Jeannot et al. 2012) and >80 % in countries where a school-based program exists (i.e., Australia, UK, Portugal, Denmark) (Agius et al. 2010; Forster et al. 2010; Dorleans et al. 2010). However, what is the feasibility and acceptability of such a program in France? Indeed, the last school-based program in France involved the hepatitis B vaccination in 1994, and the controversy over the supposed link between vaccination and multiple sclerosis was sufficient to bring a halt to the immunization campaign. This controversy is still a factor reported by parents, even favorable ones (Haesebaert et al. 2012), and questions about side effects remained a substantial difficulty reported by general practitioners in our study. Therefore, strategies to communicate better about expected benefits and the safety of vaccines might represent a way to reassure uncertain parents and to translate acceptability of favorable parents into action to vaccinate their daughters (Kempe et al. 2011).

Limitations and strengths

Our study had some limitations. Although our samples in 2007 and 2010 were representative of the general practitioners of the Rhône-Alpes region of France, we cannot exclude a selection bias of general practitioners, especially those in favor of HPV vaccination or interested in cervical cancer prevention. Given that samples were unmatched, comparisons between samples, evolution of opinion and practice between 2007 and 2010, and factors which might explain changes need to be interpreted with care, even though characteristics of both groups were similar (except for practice of homeopathy and acupuncture). Moreover, we used a cross-sectional design instead of a longitudinal one. This last would have been preferable to study the evolution between 2007 and 2010.

Despite these limitations, this repeated cross-sectional study allowed to realize a longitudinal approach of opinions and practice regarding HPV vaccination. To our knowledge, no cross-sectional study has been already performed on this topic. Though difficulties of French general practitioners in providing HPV vaccination could be applied to countries where a school-based program do not exist, several factors specific to France make it a particularly interesting case study of them. Indeed, the target age for immunization is relatively old compared with that in other countries, and the substantial suspicion related to new vaccines—since the (unfounded) controversy in the 1990s regarding the association of the hepatitis B vaccination with risk of multiple sclerosis—is a specific context that could interested countries where similar suspicion exits (UK and the alleged link between autism and MMR vaccine).

This study highlights the fact that general practitioners are mainly in favor of HPV vaccination in France and that this favorable opinion increased between 2007 and 2010. However, practice of HPV vaccination remains too weak, especially in the target, 14-year-old age group. Difficulties in providing HPV vaccinations are frequent and have remained stable after 3 years of practice. As a result, implementing a school-based program or changing the recommended target age of 14 years old may represent effective ways of improving coverage of HPV vaccination; however, fear of parents regarding side effects might remain a real barrier that must be overcome with time.

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Conflict of interest Authors declared no competing interests expect Yann Leocmach who are an employee of Sanofi Pasteur MSD, Lyon, France.

Ethics All GPs provided written informed consent, and all data were registered in an anonymous way. This study complies with the current French laws and was approved by the French National Committee for personal data protection in medical research (CNIL) and by the local institutional review boards (CPP).

References

Agius PA, Pitts MK, Smith AM, Mitchell A (2010) Human papillomavirus and cervical cancer: Gardasil vaccination status and knowledge amongst a nationally representative sample of Australian secondary school students. Vaccine 28:4416–4422

Brotherton JM, Fridman M, May CL, Chappell G, Saville AM, Gertig DM (2011) Early effect of the HPV vaccination programme on cervical abnormalities in Victoria, Australia: an ecological study. Lancet 377:2085–2092

Creswell JW, Plano Clark VL (2007) Designing and conducting mixed methods research. Sage Publications, Thousand Oaks

Daley MF, Crane LA, Markowitz LE, Black SR, Beaty BL, Barrow J et al (2010) Human papillomavirus vaccination practices: a survey of US physicians 18 months after licensure. Pediatrics 126:425–433

Darden PM, Thompson DM, Roberts JR, Hale JJ, Pope C, Naifeh M, et al. (2013) Reasons for not vaccinating adolescents: national immunization survey of teens, 2008–2010. Pediatrics 131:645–651

De Carvalho NS, Teixeira LM, Pradel EM, Gabardo J, Joly C, Urbanetz AA (2009) Vaccinating against HPV: physicians' and medical students' point of view. Vaccine 27:2637–2640

Demarteau N, Detournay B, Tehard B, El Hasnaoui A, Standaert B (2011) A generally applicable cost-effectiveness model for the evaluation of vaccines against cervical cancer. Int J Public Health 56:153–162

Donovan B, Franklin N, Guy R, Grulich AE, Regan DG, Ali H et al (2011) Quadrivalent human papillomavirus vaccination and

trends in genital warts in Australia: analysis of national sentinel surveillance data. Lancet Infect Dis 11:39–44
Dorleans F, Giambi C, Dematte L, Cotter S, Stefanoff P, Mereckiene J, et al. (2010) The current state of introduction of human papillomavirus vaccination into national immunisation schedules in Europe: first results of the VENICE2 2010 survey. Euro Surv 15(47)
European Centre for Disease prevention and Control (2012) ECDC guidance, introduction of HPV vaccines in European Union countries—an update. pp 19
Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM (2011) Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. Int J Cancer 127:2893–2917
Forster AS, Marlow LA, Wardle J, Stephenson J, Waller J (2010) Understanding adolescents' intentions to have the HPV vaccine. Vaccine 28:1673–1676
Haesebaert J, Lutringer-Magnin D, Kalecinski J, Barone G, Jacquard AC, Régnier V et al (2012) French women's knowledge of and attitudes towards cervical cancer prevention and the acceptability of HPV vaccination among those with 14–18 year old daughters: a quantitative–qualitative study. BMC Public Health 12:1034
Haut Conseil de la santé publique (2011). Avis relatif au vaccin Gardasil® et à la stratégie de prévention globale des cancers du col de l'utérus à la vaccination contre les infections à papillomavirus humains des jeunes filles âgées de 14 à 23 ans (HPV vaccination recommendations from the « Haut Conseil de la santé publique » in France). Available: http://www.hcsp.fr/docspdf/avisrapports/hcspa20111021_gardasil.pdfhttp://www.fncgm.com/images/Actualites_medicales_scientifiques/vaccin_pap_hcsp_12-2010.pdf. Accessed 22 February 2013
Hopkins TG, Wood NJ, West RM, Darling JC (2009) UK health professionals' attitudes and knowledge regarding Human Papillomavirus (HPV) vaccination: a West Yorkshire Study. J Paediatr Child Health 45:652–655
Institut de Veille Sanitaire (2012) Projection de l'incidence et de la mortalité par cancer en France en 2011: col de l'utérus. Available:http://invs.sante.fr. Accessed 30 January 2013
Jeannot E, Sudre P, Chastonay P (2012) HPV vaccination coverage within 3 years of program launching (2008–2011) at Geneva State, Switzerland. Int J Public Health 57:629–632
Jensen ME, Hartenbach E, McElroy JA, Faerber A, Havighurst T, Kim KM et al (2009) Brief report: measuring the attitudes of health care professionals in Dane County toward adolescent immunization with HPV vaccine. WMJ 108:203–205
Jim CC, Lee JW, Groom AV, Espey DK, Saraiya M, Holve S et al (2012) Human papillomavirus vaccination practices among providers in Indian health service, tribal and urban Indian healthcare facilities. J Womens Health 21:372–378
Kahn JA, Cooper HP, Vadaparampil ST, Pence BC, Weinberg AD, LoCoco SJ et al (2009) Human papillomavirus vaccine recommendations and agreement with mandated human papillomavirus vaccination for 11-to-12-year-old girls: a statewide survey of Texas physicians. Cancer Epidemiol Biomarkers Prev 18:2325–2332
Kempe A, Daley MF, McCauley MM, Crane LA, Suh CA, Kennedy AM et al (2011) Prevalence of parental concerns about childhood vaccines: the experience of primary care physicians. Am J Prev Med 40:548–555
Ko EM, Missmer S, Johnson NR (2010) Physician attitudes and practice toward human papillomavirus vaccination. J Low Genit Tract Dis 14:339–345
Krupp K, Marlow LA, Kielmann K, Doddaiah N, Mysore S, Reingold AL et al (2010) Factors associated with intention-to-recommend human papillomavirus vaccination among physicians in Mysore, India. J Adolesc Health 46:379–384
Leib S, Liberatos P, Edwards K (2011) Pediatricians' experience with and response to parental vaccine safety concerns and vaccine refusals: a survey of Connecticut pediatricians. Public Health Rep 126(Suppl 2):13–23
Lu B, Kumar A, Castellsagué X, Giuliano AR (2011) Efficacy and safety of prophylactic vaccines against cervical HPV infection and diseases among women: a systematic review and meta-analysis. BMC Infect Dis 11:13
Lutringer-Magnin D, Kalecinski J, Barone G, Leocmach Y, Regnier V, Jacquard AC et al (2011) Human papillomavirus (HPV) vaccination: perception and practice among French general practitioners in the year since licensing. Vaccine 29:5322–5328
Marlow LA, Wardle J, Forster AS, Waller J (2009) Ethnic differences in human papillomavirus awareness and vaccine acceptability. J Epidemiol Commun Health 63:1010–1015
McCave EL (2010) Influential factors in HPV vaccination uptake among providers in four states. J Commun Health 35:645–652
Miles MB, Huberman MA (2003) Analyse des données qualitatives. De Boeck, Bruxelles, p 2
Munoz N, Bosch FX, de Sanjose S, Herrero R, Castellsague X, Shah KV et al (2003) Epidemiologic classification of human papillomavirus types associated with cervical cancer. N Engl J Med 348:518–527
Pélissier G, Bastides F (2008) Vaccination anti-HPV dans le cadre de la prévention du cancer du col de l'utérus en médecine générale. Rev Prat 58:25–31
Perkins RB, Clark JA (2012) What affects human papillomavirus vaccination rates? A qualitative analysis of providers' perceptions. Womens Health Issues 22:e378–e379
Piana L, Noel G, Uters M, Laporte R, Minodier P (2009) Standpoint and practice concerning the human Papillomavirus vaccine among French family physicians. Med Mal Infect 39:789–797
Post RE, Carek PJ, Mainous Iii AG, Diaz VA, Johnson SP (2013) Factors affecting HPV vaccine use among recent family medicine residency graduates. Fam Med 45:90–94
Remes P, Selestine V, Changalucha J, Ross DA, Wight D, de Sanjosé S et al (2012) A qualitative study of HPV vaccine acceptability among health workers, teachers, parents, female pupils, and religious leaders in northwest Tanzania. Vaccine 30:5363–5367
Schnatz PF, Humphrey K, O'Sullivan DM (2010) Assessment of the perceptions and administration of the human papillomavirus vaccine. Low Genit Tract Dis 14:103–107
Trim K, Nagji N, Elit L, Roy K (2012) Parental knowledge, attitudes, and behaviours towards human papillomavirus vaccination for their children: a systematic review from 2001 to 2011. Obstet Gynecol Int 2012:921236
Vadaparampil ST, Kahn JA, Salmon D, Lee JH, Quinn GP, Roetzheim R et al (2011) Missed clinical opportunities: provider recommendations for HPV vaccination for 11–12 years old girls are limited. Vaccine 29:8634–8641
Wong LP (2011) Issues surrounding HPV vaccine delivery in a multiethnic country in Asia: the physician's perspective. J Commun Health 36:14–22
Young JL, Bernheim RG, Korte JE, Stoler MH, Guterbock TM, Rice LW (2011) Human papillomavirus vaccination recommendation may be linked to reimbursement: a survey of Virginia family practitioners and gynecologists. J Pediatr Adolesc Gynecol 24:380–385