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T. Kolben, Christian Dannecker, K. Baltateanu, C. Goess, T. Starrach, A. Semmlinger, Nina Ditsch, Julia Gallwas, S. Mahner, Klaus Friese, T. Kolben

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HPV Vaccination: Attitude and Knowledge among German Gynecologists

HPV-Impfung: Einstellung und Wissensstand unter Gynäkologen in Deutschland

Authors

T. M. Kolben, C. Dannecker, K. Baltateanu, C. Goess, T. Starrach, A. Semmlinger, N. Ditsch, J. Gallwas, S. Mahner, K. Friese, T. Kolben

Affiliation

Department for Obstetrics and Gynecology, University Hospital of Munich, Ludwig-Maximilians-University, Munich, Germany

Abstract



Purpose: In order to achieve a higher vaccination rate, education on HPV as well as options for prophylaxis performed by doctors is of great importance. One opportunity to increase the protection against HPV would be vaccinating boys. This study evaluated attitude and knowledge among German gynecologists regarding HPV vaccination, especially in boys.

Material and Methods: A questionnaire with 42 questions about demographics, attitude and knowledge about HPV and HPV vaccination was sent to members of the German Society for Gynecology and Obstetrics (DGGG).

Results: 998 out of 6567 addressed gynecologists participated. Knowledge about HPV, associated diseases and possible HPV vaccines was high among participants. The attitude towards vaccination in boys as well as girls was positive. Only 8.2% refused to vaccinate their sons whereas 2.2% refused to do this for their daughters. However, only few gynecologists vaccinated their daughters and sons against HPV. Main reason for girls was an age outside of vaccination guidelines; for boys it was the lack of cost coverage.

Conclusion: The willingness of gynecologists to perform HPV vaccination in boys is as high as for girls. However, sons of gynecologists are only rarely vaccinated against HPV. Main reason is the lack of cost coverage. Vaccinating boys could decrease the disease burden in males, as well as protect women by interrupting ways of transmission. Since the main argument against vaccination of boys is only of financial nature, the necessity of a vaccination recommendation for boys needs to be re-evaluated taking into account the cost-reduced 2-dose vaccination scheme.

Zusammenfassung



Ziel: Zur Erreichung einer höheren Durchimpfungsrate ist die Aufklärung über HPV sowie Möglichkeiten der Prophylaxe durch den Arzt enorm wichtig. Eine Möglichkeit zur Optimierung des Schutzes gegenüber HPV besteht in der Impfung von Jungen. Diese Studie untersucht daher Einstellung und Wissensstand unter Gynäkologen bezüglich der HPV-Impfung insbesondere bei Jungen.

Methoden: Ein Fragebogen mit 42 Fragen zu demografischen Daten sowie Haltung und Wissen über HPV und die HPV-Impfung wurde an Mitglieder der Deutschen Gesellschaft für Gynäkologie und Geburtshilfe (DGGG) versendet.

Ergebnisse: Es beteiligten sich 998 von 6567 angeschriebenen Ärzten. Das Wissen zu HPV, assoziierten Erkrankungen sowie möglichen HPV-Impfungen unter den Teilnehmern war hoch. Es bestand eine hohe Bereitschaft zur Impfung von Mädchen, aber auch hinsichtlich der Impfung von Jungen waren die Befragten positiv gestimmt. Nur 8,2% der Befragten würden eine HPV-Impfung ihres Sohnes ablehnen, 2,2% würden dies bei ihren Töchtern tun. Letztlich haben jedoch nur wenige die Impfung bei ihren Töchtern und Söhnen durchgeführt. Hauptgrund bei Mädchen war hierfür ein außerhalb der Impfpflicht liegendes Alter, bei Jungen die aktuell fehlende Kostenübernahme der Krankenkasse.

Folgerung: Die Bereitschaft unter Gynäkologen, die HPV-Impfung an Männern durchzuführen, ist ähnlich hoch wie bei Frauen. Dennoch sind die Söhne der Befragten eher selten geimpft. Ursächlich ist hauptsächlich die fehlende Kostenübernahme. Eine Impfung von Jungen könnte jedoch die Krankheitslast bei Männern senken und über eine Unterbrechung der Übertragungswege ebenso Frauen schützen. Da das Hauptargument gegen eine Impfung von Jungen lediglich finanzieller Natur ist, sollte, in Anbetracht des kostengünsti-

Correspondence

Dr. Theresa M. Kolben
Department for Obstetrics
and Gynecology
Ludwig-Maximilians-University
Marchioninistraße 15
81377 Munich
Germany
Theresa.Kolben@
med.uni-muenchen.de

geren 2-Dosen-Impfschemas, die Notwendigkeit einer Impfempfehlung für Jungen neu überdacht werden.

Introduction

Infection with human papilloma virus (HPV) represents the most common sexually transmitted disease worldwide. More than a hundred types of HPV are identified with subclassification in either low-risk or high-risk types. Low-risk HPV types 6 and 11 cause anogenital warts also known as condylomata acuminata [1, 2]. HPV high-risk types are associated with a number of malignant diseases, e.g. cervical, vaginal, vulvar, penile, oropharyngeal and anal carcinoma [3, 4]. Virtually all cases of cervical cancer are attributed to HPV. HPV high-risk types 16 and 18 are responsible for 70–80% of all cervical cancers [5–7]. The vast majority of sexually active adults (75–80%) has had an infection with HPV before the age of 50 [8]. To date, the most effective tool against HPV infection is primary prevention by vaccination. Two vaccines (Gardasil, Merck & Co. and Cervarix, GlaxoSmithKline) have already demonstrated high efficacy against HPV 16 and 18 associated cancers as well as cervical intraepithelial neoplasia as the precursor lesions of cervical cancer [9–13]. Gardasil is EMA (European Medicines Agency)-approved for both sexes, while the EMA-approval for Cervarix is currently limited to females only. Gardasil-9 is a newly EMA-approved nonavalent vaccine, which is targeted against HPV types 6, 11, 16, 18, 31, 33, 45, 52 and 58 [14]. It has been shown to be 96.7% effective against cervical, vaginal and vulvar intraepithelial neoplasia caused by HPV types 31, 33, 45, 52 and 58 [15] when compared to quadrivalent Gardasil [15]. However, high coverage is needed in order to achieve a high efficacy for vaccination programmes. Still, despite a proven efficacy and security profile, the vaccination coverage in Germany is only about 40% [16]. To achieve a higher coverage, education on HPV, its associated diseases, routes of transmission and possibilities for prevention needs to be expanded. Many young people use electronic media as their primary source of information [17, 18]. However, there is still a large proportion that gathers their information about medical issues when visiting their doctor. However, when young men are asked about their level of information regarding HPV, over 90% state that they have never been informed by their primary care physician [19]. Updated knowledge and positive attitude towards the vaccine are shown to be the main determinant factors for recommendation of vaccination among physicians [20, 21]. Especially in HPV vaccination, it is well documented that the physician's experience and attitude towards HPV vaccine are major motivators for patients to receive immunization [16, 22]. We therefore aimed to determine the level of knowledge about HPV and the attitude towards HPV vaccination in obstetricians and gynecologists.

Material and Methods

Design of the questionnaire

A self-designed questionnaire containing 42 multiple-choice questions was used.

Part of the questions allowed multiple answers, whereas in some questions there was only one answer possible. A few questions had the option to add a free text answer if desired. Questions were designed according to similar literature already published.

Content of the questionnaire

The questionnaire was divided into three sections.

The first section containing 11 questions surveyed demographic data of the participants (age, gender, nationality, smoking status, education, working experience).

The second section containing 16 questions focused on the attitude of the participants towards vaccination (own vaccination status, reasons against vaccination) in general and vaccination against HPV for girls and boys in particular.

The third section containing 15 questions was designed as a quiz about HPV and the HPV vaccination in order to evaluate the level of knowledge of the participants concerning these topics (relevant HPV types, HPV-related diseases, risk factors for HPV-related diseases, incidence and prevalence of HPV infection in females and males, details about specific vaccinations).

Process of data collection

The survey was sent to members of the German Society for Obstetrics and Gynecology (DGGG) as an online questionnaire. The DGGG supported the survey by creating the electronic version of the questionnaire and sending the link for the inquiry via their mailing list to all members. The participants were informed that the survey was part of a scientific study. Participation in the inquiry was anonymous and voluntary. The inquiry was open for participation between November 2015 and February 2016. One reminder was sent out after 1.5 months. Participation was possible only once due to IP address recognition.

Statistics

An entry mask for data collection and evaluation of the returned questionnaires was created in the program SPSS, version 22 (SPSS Inc., Chicago, IL, USA).

Results

Demographics

A total of 998 out of 6567 addressed physicians (15.2%) agreed to participate in the study and returned the questionnaire. 768 of the participants were female (77.4%) and 224 were male (22.6%), the median age was 41 (23–83) years. 733 (76.8%) have children and 929 (93.6%) have a German nationality. 73 (7.4%) are active and 105 (10.6%) were former smokers. The majority of 918 respondents (92.8%) attended university in Germany. 35 (3.5%) participants absolved the major part of their residency in private practice, 214 (21.6%) in hospitals with basic care, 245 (24.7%) in hospitals with specialized care and 478 (48.2%) in hospitals with maximum care. 208 (21.0%) are not yet board-certified, whereas 265 (26.7%) have been board-certified for 0–5 years, 208 (21.0%) for 5–10 years, 183 (18.5%) for 10–20 years and 127 (12.8) for more than 20 years. The majority of 86.2% indicate a positive attitude towards scientific trials whereas only 9.4% have a negative attitude towards it. An overview of demographic data is given in **Table 1**.

Attitude towards vaccinations including HPV

The majority of 953 (98.2%) respondents agree with the STIKO (Ständige Impfkommission = permanent vaccination commission)

Table 1 Demographic data.

	Total n (%)
	998 (100.0)
Median age (years)	43
Sex	
▶ Female	768 (77.4)
▶ Male	224 (22.6)
▶ n. a.	6
Nationality	
▶ German	929 (93.6)
▶ Other	71 (7.2)
▶ n. a.	5
Smoker	
▶ Yes	73 (7.4)
▶ No	813 (82.0)
▶ Not anymore	105 (10.6)
▶ n. a.	7
Place of study	
▶ Germany	918 (92.8)
▶ Other	96 (9.7)
▶ n. a.	9
Highest academic title	
▶ None	275 (27.7)
▶ Dipl. med.	28 (2.8)
▶ Dr. med.	627 (63.3)
▶ PD Dr. med.	24 (2.4)
▶ Prof. Dr. med.	37 (3.7)
▶ n. a.	7
Residency	
▶ Private practice	35 (3.5)
▶ Hospital with basic care	214 (21.6)
▶ Hospital with specialized care	245 (24.7)
▶ Hospital with maximum care	478 (48.2)
▶ Other	20 (2.0)
▶ n. a.	6
Years passed since board examination	
▶ 0–5 years	265 (26.7)
▶ 5–10 years	208 (21.0)
▶ 10–20 years	183 (18.5)
▶ > 20 years	127 (12.8)
▶ Not yet board-certified	208 (21.0)
▶ n. a.	7
Children	
▶ Yes	221 (23.2)
▶ No	733 (76.8)
▶ n. a.	44

n. a. = no answer.

recommendations. Consequently, 932 (96.3%) are partially or completely vaccinated along with these recommendations (HPV excluded) and 924 (98.3%) would vaccinate their children accordingly. 808 (83.2%) have not received HPV vaccination for themselves. 21 (2.2%) would decline to vaccinate their own daughter, whereas 75 (8.2%) would not vaccinate their own son against HPV. Of all three vaccines, most participants would use Gardasil, followed by Gardasil-9 and finally Cervarix to vaccinate their children, regardless of their sex. When asked if they actually did vaccinate their daughters against HPV, 198 (21.5%) used Gardasil, 17 (1.8%) Cervarix, 321 (34.8%) did not vaccinate their daughters and 398 (43.1%) do not have a daughter. 144 (80.9%) of those who did not or would not vaccinate their daughters argued that their daughter's age does not lie within the official guide-

lines. Three (1.7%) indicated negative experiences with vaccination as their reason and 3 (1.7%) were afraid of side effects.

489 (52.9%) did not vaccinate their sons, 375 (40.6%) do not have a son and 58 (6.3%) performed HPV vaccination of their son using Gardasil. Of those who answered that they did not vaccinate their sons, the following reasons were named: age not within the recommendations (63.9%), no cost coverage (23.5%), HPV-associated diseases mainly affect women (4.2%), side effects (2.5%). An overview is given in [Table 2](#).

Participants' level of information on HPV

When asked what diseases were possibly caused by HPV the following answers were given: 922 (99.9%) cervical cancer, 842 (91.2%) penile cancer, 835 (90.5%) anal cancer, 806 (87.3%) oropharyngeal cancer, 727 (78.8%) vaginal cancer, 782 (84.7%) vulvar cancer, 378 (41.0%) rectal cancer, 355 (38.5%) esophageal cancer, and 901 (97.6%) condylomata acuminata. HPV 6 and 11 were correctly indicated as cause for condylomata acuminata by 734 (80.9%), and 753 (83.0%), respectively. HPV 16 and 18 were named by 171 (18.9%) and 173 (19.1%), respectively, to cause anogenital warts. When asked about possible risk factors associated with HPV-related diseases, more than 85% correctly identified smoking, promiscuity, immunosuppression and HIV infection. Fewer participants named a low educational level (64%) and usage of oral contraceptives (43%) as associated factors. 177 (19.5%) of respondents believed that after a genital infection with HPV 16 or 18, there is an effective antibody titer either for 10–20 years or even lifelong, whereas 163 (17.9%) indicated that they do not know an answer to this question. When asked the same question regarding immunity after vaccination instead of infection, 729 (80.1%) correctly answered that there is an immunity for at least 10–20 years. Most participants knew that Gardasil is targeted against HPV types 6 (85.0%), 11 (86.7%), 16 (96.9%) and 18 (98.5%). When asked which types Cervarix is targeted at, about 93% indicated HPV types 16 or 18, but also type 6 (12.2%) and type 11 (13.6%) were named. The same question was asked for Gardasil-9 and only 23.1% respectively 35.5% chose the wrong answers HPV type 13 or 35. 65.1% do not know that Gardasil-9 is EMA-approved for females. 316 (37.6%) believe that Cervarix is EMA-approved in males, whereas only 162 (19.3%) know that Gardasil-9 is EMA-approved in males. 218 (25.9%) believe that neither Cervarix nor Gardasil nor Gardasil-9 is EMA-approved. Almost all participants knew that there is a recommendation by the German permanent vaccination commission for Cervarix and Gardasil in girls, whereas 154 (17.8%) believe that it is the same for Gardasil-9. 618 (73.0%) knew that there is no such recommendation for boys. 403 (46.0%) respectively 405 (46.2%) indicate that the STIKO-recommendation is for girls aged 9–14 and 9–17 years. The remaining 68 (7.8%) believe that 12–17 years is the correct answer to this question. An overview is given in [Table 3](#).

Discussion

In this study, we aimed to determine the level of knowledge on HPV infection and vaccination as well as the attitude of gynecologists towards HPV vaccination.

Knowledge regarding HPV-associated diseases was high among the participants. Most respondents correctly identified all HPV-associated diseases, even if they were non-gynecological like oropharyngeal cancer (87.3%). Although almost 20% believed that

Table 2 Attitude towards vaccinations (incl. HPV).

	Total n (%)
	998 (100.0)
My willingness to participate in clinical trials as a doctor is:	
▶ Absolutely positive	371 (37.4)
▶ Rather positive	485 (48.8)
▶ Rather negative	88 (8.9)
▶ Absolutely negative	5 (0.5)
▶ I don't know	44 (4.4)
▶ n. a.	5
My attitude towards the STIKO-recommendations is:	
▶ Absolutely positive	718 (74.0)
▶ Rather positive	235 (24.2)
▶ Rather negative	12 (1.2)
▶ Absolutely negative	1 (0.1)
▶ I don't know	4 (0.4)
▶ n. a.	28
I am vaccinated according to the STIKO-recommendations (HPV excluded):	
▶ Yes, completely	809 (83.6)
▶ Yes, partially	123 (12.7)
▶ I don't know	23 (2.4)
▶ No, because ...	13 (1.3)
▶ n. a.	30
I have received a HPV vaccination for myself:	
▶ No	808 (83.2)
▶ Yes, with Gardasil	135 (13.9)
▶ Yes, with Cervarix	24 (2.5)
▶ Yes, with Gardasil-9	1 (0.1)
▶ Yes, with: other	3 (0.3)
▶ n. a.	27
I counsel female patients on HPV vaccination:	
▶ Yes	850 (87.8)
▶ No	118 (12.2)
▶ n. a.	30
I perform HPV vaccination in female patients (multiple answers possible):	
▶ Yes, with Gardasil	384 (39.6)
▶ Yes, with Cervarix	38 (3.9)
▶ Yes, with Cervarix and Gardasil	173 (17.9)
▶ Yes, with Gardasil-9	22 (2.3)
▶ No, because: there is no demand	131 (13.5)
▶ No, because: fear of side effects	1 (0.1)
▶ No, because ... (free text)	291 (30.0)
▶ n. a.	29
I counsel male patients on HPV vaccination:	
▶ Yes	151 (15.7)
▶ No	809 (84.3)
▶ n. a.	38
I perform HPV vaccination in male patients (multiple answers possible):	
▶ Yes, with Gardasil	31 (3.2)
▶ Yes, with Gardasil-9	7 (0.7)
▶ No, because: there is no demand	139 (14.4)
▶ No, because: vaccinating women is sufficient	2 (0.2)
▶ No, because: health insurance does not bear the costs	62 (6.4)
▶ No, because: HPV vaccination for men is medically not advisable	3 (0.3)
▶ No, because: fear of side effects from medical perspective	0 (0.0)
▶ No, because: gynecologist	734 (76.2)
▶ No, because ...	97 (10.1)
▶ n. a.	35

Table 2 Attitude towards vaccinations (incl. HPV). (Continued)

	Total n (%)
I would agree to vaccinate my own children according to the STIKO-recommendations (HPV excluded):	
▶ Yes, completely	861 (91.6)
▶ Yes, partially	63 (6.7)
▶ I don't know	4 (0.4)
▶ No, because ... (free text)	12 (1.3)
▶ n. a.	58
At least one of my daughters is vaccinated against HPV (multiple answers possible):	
▶ I don't have a daughter	398 (43.1)
▶ No	321 (34.8)
▶ Yes, with Gardasil	198 (21.5)
▶ Yes, with Cervarix	17 (1.8)
▶ Yes, with: other	27 (2.9)
▶ n. a.	75
I would agree to vaccinate my own daughter/s against HPV (multiple answers possible):	
▶ No	21 (2.2)
▶ Yes, with Gardasil	597 (63.9)
▶ Yes, with Cervarix	159 (17.0)
▶ Yes, with Gardasil-9	435 (46.6)
▶ Yes, with other	18 (1.9)
▶ n. a.	64
Reasons not to vaccinate my own daughter/s against HPV (multiple answers possible):	
▶ Negative experience with vaccinations	3 (1.7)
▶ Fear of side effects	3 (1.7)
▶ Belief in ineffectiveness of vaccinations in general	1 (0.6)
▶ Belief in ineffectiveness of HPV vaccination	1 (0.6)
▶ Daughter's age does not lie within the official guidelines	144 (80.9)
▶ Religiously motivated	0 (0.0)
▶ Other	33 (18.5)
▶ n. a.	820
At least one of my sons is vaccinated against HPV (multiple answers possible):	
▶ I don't have a son	375 (40.6)
▶ No	489 (52.9)
▶ Yes, with Gardasil	58 (6.3)
▶ Yes, with: other	10 (1.1)
▶ n. a.	74
I would agree to vaccinate my own son/s against HPV (multiple answers possible):	
▶ No	75 (8.2)
▶ Yes, with Gardasil	538 (59.0)
▶ Yes, with Gardasil-9	445 (48.8)
▶ Yes, with: other	22 (2.4)
▶ n. a.	86
Reasons not to vaccinate my own son/s against HPV (multiple answers possible):	
▶ Negative experience with vaccinations	1 (0.4)
▶ Fear of side effects	7 (2.5)
▶ Belief in ineffectiveness of vaccinations in general	0 (0.0)
▶ Belief in ineffectiveness of HPV vaccination	2 (0.7)
▶ Son's age does not lie within the official guidelines	182 (63.9)
▶ Vaccinating girls is a sufficient protection for men	3 (1.1)
▶ HPV-associated diseases affect mainly women	12 (4.2)
▶ No health benefit for boys	5 (1.8)
▶ Missing assumption of costs	67 (23.5)
▶ Religiously motivated	0 (0.0)
▶ Other	53 (18.6)
▶ n. a.	713

n. a. = no answer; STIKO: Ständige Impfkommission (permanent vaccination commission of Germany).

Table 3 Participants' level of information on HPV.

	Total n (%)
	998 (100.0)
Which diseases are HPV-associated?	
▶ Cervical cancer	922 (99.9)
▶ Penile cancer	842 (91.2)
▶ Anal cancer	835 (90.5)
▶ Oropharyngeal cancer	806 (87.3)
▶ Vaginal cancer	727 (78.8)
▶ Vulvar cancer	782 (84.7)
▶ Rectal cancer	378 (41.0)
▶ Esophageal cancer	355 (38.5)
▶ Condylomata acuminata	901 (97.6)
▶ n. a.	75
Which HPV types typically cause condylomata acuminata?	
▶ 6	734 (80.9)
▶ 11	753 (83.0)
▶ 13	79 (8.7)
▶ 16	171 (18.9)
▶ 18	173 (19.1)
▶ 31	65 (7.2)
▶ 45	47 (5.2)
▶ n. a.	91
What are typical risk factors for HPV-associated diseases?	
▶ Smoking	797 (86.6)
▶ Promiscuity	893 (97.1)
▶ Usage of the contraceptive pill	394 (42.8)
▶ Low educational level	590 (64.1)
▶ Immunosuppression	841 (91.4)
▶ HIV infection	806 (87.6)
▶ n. a.	78
Is there an effective antibody titer after a genital infection with HPV 16 or 18?	
▶ No effective antibody titer	530 (58.2)
▶ Effective antibody titer for approximately 1–2 years	40 (4.4)
▶ Effective antibody titer for approximately 10–20 years	107 (11.8)
▶ Longlife immunity	70 (7.7)
▶ I don't know	163 (17.9)
▶ n. a.	88
Is there an effective antibody titer after vaccination against HPV 16 or 18?	
▶ Effective antibody titer for approximately 1–2 years	15 (1.7)
▶ Effective antibody titer for approximately 5–7 years	163 (18.0)
▶ Effective antibody titer for at least 10–20 years	729 (80.4)
▶ n. a.	91
Incidence of HPV infection is...	
▶ Higher in women	379 (41.6)
▶ Higher in men	40 (4.4)
▶ Equivalent in men and women	380 (41.7)
▶ I don't know	112 (12.3)
▶ n. a.	87
Prevalence of HPV infection is...	
▶ Higher in women	419 (45.9)
▶ Higher in men	31 (3.4)
▶ Equivalent in men and women	309 (33.8)
▶ I don't know	154 (16.9)
▶ n. a.	85
Gardasil is targeted against HPV type...	
▶ 6	734 (85.0)
▶ 11	749 (86.7)
▶ 13	60 (6.9)
▶ 16	837 (96.9)
▶ 18	851 (98.5)
▶ 31	65 (7.5)
▶ 33	47 (5.4)

Table 3 Participants' level of information on HPV. (Continued)

	Total n (%)
▶ 35	15 (1.7)
▶ 45	32 (3.7)
▶ 52	12 (1.4)
▶ 58	8 (0.9)
▶ n. a.	134
Cervarix is targeted against HPV type...	
▶ 6	102 (12.2)
▶ 11	113 (13.5)
▶ 13	30 (3.6)
▶ 16	778 (93.3)
▶ 18	783 (93.9)
▶ 31	40 (4.8)
▶ 33	39 (4.7)
▶ 35	18 (2.2)
▶ 45	34 (4.1)
▶ 52	6 (0.7)
▶ 58	4 (0.5)
▶ n. a.	164
Gardasil-9 is targeted against HPV type...	
▶ 6	702 (92.0)
▶ 11	708 (92.8)
▶ 13	176 (23.1)
▶ 16	750 (98.3)
▶ 18	756 (99.1)
▶ 31	561 (73.5)
▶ 33	580 (76.0)
▶ 35	271 (35.5)
▶ 45	558 (73.1)
▶ 52	460 (60.3)
▶ 58	366 (48.0)
▶ n. a.	235
EMA-approval in females exists for...	
▶ Cervarix	846 (97.1)
▶ Gardasil	865 (99.3)
▶ Gardasil-9	304 (34.9)
▶ None	0 (0.0)
▶ n. a.	127
EMA-approval in males exists for...	
▶ Cervarix	316 (37.6)
▶ Gardasil	603 (71.7)
▶ Gardasil-9	162 (19.3)
▶ None	218 (25.9)
▶ n. a.	157
STIKO-recommendation for females exists for...	
▶ Cervarix	784 (90.8)
▶ Gardasil	842 (97.6)
▶ Gardasil-9	154 (17.8)
▶ None	6 (0.7)
▶ n. a.	135
STIKO-recommendation for males exists for...	
▶ Cervarix	110 (13.0)
▶ Gardasil	212 (25.0)
▶ Gardasil-9	42 (5.0)
▶ None	618 (73.0)
▶ n. a.	151
HPV vaccination for girls is recommended by the STIKO...	
▶ Between the age of 9–14	403 (46.0)
▶ Between the age of 9–17	405 (46.2)
▶ Between the age of 12–17	68 (7.8)
▶ n. a.	122

EMA: European Medicines Agency; STIKO: Ständige Impfkommission (Permanent vaccination commission of Germany); n. a. = no answer.

genital warts were caused by high-risk HPV types 16 and 18, the majority of more than 80% identified types 6 and 11 as the correct answers. Typical risk factors like smoking, promiscuity, immunosuppression and HIV infection were named correctly by more than 85%, but only 43% knew that a low educational level is a risk factor, too. Still, compared to similar surveys, the level of information regarding HPV infection is high [23,24]. A study in the United Kingdom showed that up to 55% of respondents had a lack of knowledge about the etiology of cervical cancer [25]. One of the reasons for this discrepancy could be that most surveys were performed among pediatricians and family care doctors in addition to gynecologists instead of gynecologists alone. Compared to these two subspecialties, gynecologists are more often confronted with the consequences of HPV infection, such as genital warts or cervical cancer. In contrast, vaccinations are typically performed at the office of pediatricians or general practitioners, so the question arose, how much knowledge gynecologists do have on HPV vaccination. On the one hand most participants knew which HPV types are targeted by Gardasil and Cervarix, and even Gardasil-9, which was EMA-approved only in 2015, is already well-known. On the other hand, more than a third of the participants were not informed properly about an effective antibody titer after HPV infection; almost 20% of the respondents wrongly believe that there is an effective antibody titer either for 10–20 years or even lifelong after an HPV infection with types 16 or 18, whereas additional 18% indicate that they do not know the answer. In fact, around 50% of women do not develop an antibody response after natural infection and in those who do, the extent and the duration of protection against HPV infection is still unknown [26,27]. These findings could indicate that there is no effective natural immunity after HPV infection and emphasize the necessity of HPV vaccination even for women who already experienced HPV infection.

In awareness of the known low HPV vaccination coverage rate in girls, vaccinating boys could represent an additional option to optimize protection for women, too. Vaccinating boys is effective and could also help to reduce HPV-associated disease burden in males [28]. Interestingly, only 8.2% of respondents refused to vaccinate their sons against HPV compared to 2.2% in daughters. However, 52.9 vs. 34.8% did not vaccinate their sons respectively their daughters. The main reason besides the fact that the age of their children did not fit into the age recommendations, was with 23.5% the missing cost coverage for males. Additionally, 4.2% think that HPV vaccination in males is not necessary since associated diseases mainly affect women. Presently, in Germany there is a STIKO vaccination recommendation regarding HPV for girls aged 9–14 years only. Men are excluded from this recommendation and therefore vaccination is not covered by general insurance. In contrast, Australia, Canada, Austria and the USA already have guidelines that recommend vaccination in boys, too [29–32]. The decision if HPV vaccination should also be recommended for boys needs a thorough cost-benefit analysis. Previous modeling studies have shown that in case of high vaccination coverage of girls, sufficient protection for boys would be generated, too [33].

However, coverage in Germany is low which could partially be attributed to the lack of school-based vaccination programs. In order to achieve higher protection for girls, vaccinating boys could represent a useful supplement that would also help decrease the disease burden in men, too. Since recent analyses showed that depending on the age of patients also two doses of vaccine provide sufficient immune response, re-calculation regarding cost

efficacy for HPV vaccination in men needs to be done. Still, irrespective of a possible cost coverage of HPV vaccination by health insurances, counseling also male patients about the disease as well as possible ways of protection is crucial to further decrease HPV-associated disease burden. Especially young people gather their information about health-related topics oftentimes through the internet [17,18]. Unfortunately, electronic media is frequently not monitored for correctness and sometimes fails to provide reliable and transparent information [34]. One way to overcome this difficulty could be the introduction of certain standards that might help readers to identify correct and reliable sources. In addition, the discussion about health topics with their primary physician is irreplaceable. However, gynecologists only rarely counsel male patients during their daily work-routine. Besides general practitioners mostly pediatricians get in touch with young men and get the chance to discuss the issue of HPV vaccination with them. Therefore, a similar survey performed among pediatricians would be highly valuable.

Conclusion

In conclusion this inquiry demonstrates that gynecologists in Germany are very well informed about HPV and available HPV vaccines. Furthermore, there is a very positive attitude of these specialists towards the vaccination against HPV, even in males. However, sons of gynecologists are only rarely vaccinated against HPV, mainly due to the lack of cost coverage. Vaccinating boys could not only decrease the disease burden in males, but also protect women by interrupting ways of transmission. In light of the fact that vaccination coverage in Germany is low, alternatives to increase protection need to be evaluated. One possible option represents vaccination of males, which is performed already by several countries. This survey showed that the main argument of gynecologists against vaccination of boys is only of financial and not of medical nature. However, the necessity of a vaccination recommendation for boys needs to be re-evaluated taking into account the cost-reduced 2-dose vaccination scheme.

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Conflict of Interest

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