



Clin Exp Vaccine Res 2022;11:149-154  
<https://doi.org/10.7774/cevr.2022.11.2.149>  
 pISSN 2287-3651 • eISSN 2287-366X

Hitomi Nishioka<sup>1</sup>, Tomoko Onishi<sup>2</sup>,  
 Taito Kitano<sup>2,3</sup>, Masahiro Takeyama<sup>2</sup>,  
 Natsuko Imakita<sup>4</sup>, Kei Kasahara<sup>4</sup>,  
 Ryuji Kawaguchi<sup>5</sup>, Jennifer Akiko  
 Masaki<sup>2</sup>, Keiji Nogami<sup>2</sup>

<sup>1</sup>Department of Pediatrics, Nara Prefecture Seiwa Medical Center, Sango; <sup>2</sup>Department of Pediatrics, Nara Medical University, Kashihara, Japan; <sup>3</sup>Division of Infectious Diseases, The Hospital for Sick Children, Toronto, ON, Canada; <sup>4</sup>Center for Infectious Diseases, Nara Medical University, Kashihara; <sup>5</sup>Department of Obstetrics and Gynecology, Nara Medical University, Kashihara, Japan

Received: March 7, 2022

Accepted: May 6, 2022

Corresponding author: Tomoko Onishi, MD, PhD  
 Department of Pediatrics, Nara Medical University, 840 Shijo-cho, Kashihara, Nara, Japan  
 Tel: +81-744-29-8881, Fax: +81-744-24-9222  
 E-mail: tomosu@naramed-u.ac.jp

No potential conflict of interest relevant to this article was reported.

We gratefully acknowledge Tomoko Hashiguchi (Department of Nursing, Nara Medical University) who efforded to disseminate our research, and we also acknowledge all healthcare workers who kindly participated in this study.



© Korean Vaccine Society.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

# A survey of healthcare workers' recommendations about human papillomavirus vaccination

**Purpose:** The human papillomavirus (HPV) vaccine is safe and effective for preventing HPV-related diseases. However, HPV vaccination rates in Japan are low because the “Ministry of Health, Labour and Welfare” had stopped recommending vaccination. We assessed healthcare workers' (HCWs) current recommendations regarding the HPV vaccine and how the provision of information about HPV vaccination affected their recommendations.

**Materials and Methods:** A survey was conducted among nurses and physicians in Nara prefecture from March 2021 to July 2021. The questionnaire asked about their understanding, recommendations, and opinions regarding HPV vaccination. Before answering the last two questions (optional), the HCWs read evidence-based information quantifying the risks and benefits of HPV vaccination.

**Results:** A total of 441 HCWs completed the questionnaire. Only 19% of HCWs always recommended HPV vaccination for girls aged 12–16 years. The evidence-based information significantly improved the percentage of HCWs who would “always recommend” vaccination.

**Conclusion:** This study showed that the proportion of HCWs who recommend HPV vaccination to adolescent girls remains low in Japan. However, we found that evidence-based information describing the causal relationship between adverse events and vaccination, quantifying the risks and benefits, noting the importance of HCW communications with families, and reporting the recommendations of national societies, might increase HCWs' recommendations for HPV vaccination.

**Keywords:** Human papillomavirus, Healthcare workers, Survey, Vaccines, Vaccine acceptance

## Introduction

The human papillomavirus (HPV) vaccine is safe and effective for preventing HPV-related diseases, including cervical cancer, head and neck cancer, anogenital cancer, and genital warts [1,2]. Although HPV infection causes a significant burden [3], the vaccine coverage rate has been low in Japan (0.8% in 2018) due to concerns about adverse events reported by the media. Subsequently, the Ministry of Health, Labour and Welfare (MHLW) withdrew its recommendation for HPV vaccination, although it was still included in the national immunization program for girls aged 12–16 years [3,4]. Direct communications from healthcare workers (HCWs) are the most critical factor for recovering the acceptance of HPV vaccination in the Japanese population [5]. How-

ever, only 16% of physicians in Japan vaccinated adolescent girls in 2015 and 2016 [6]. Furthermore, physicians were less likely to recommend the HPV vaccine than other adolescent vaccines [7]. Therefore, it is crucial to provide HCWs with evidence-based information about the HPV vaccine so that they can educate adolescent patients and their families. Our objective was to assess the current recommendations about HPV vaccination provided by HCWs and evaluate whether the provision of evidence-based information about the HPV vaccine affects their recommendations.

### Materials and Methods

A survey of nurses and physicians was conducted from March 24, 2021, to July 31, 2021, in Nara prefecture, Japan. The questionnaire was distributed via email (listservs) or by hard copy given directly to participants (convenience sample). There were ten questions regarding the HCWs' understanding, recommendations, and opinions about HPV vaccination. The last two questions (which were optional) asked HCWs to read two information sheets: A, from the MHLW (<https://www.mhlw.go.jp/content/000679265.pdf>), and B, from the Department of Pediatrics, Nara Medical University ([https://www.naramed-u.ac.jp/~ped/pdf/cervical\\_cancer\\_vaccine.pdf](https://www.naramed-u.ac.jp/~ped/pdf/cervical_cancer_vaccine.pdf)) [8,9]. Both A and B provided information about the benefits (prevention of HPV-related diseases) and risks (adverse events) of HPV vaccination as well as the epidemiology of cervical cancer and HPV infection. While information sheet A descriptively explained the benefits and risks, information sheet B focused on studies reporting the causality between adverse events and vaccination [2], quantifying the risks and benefits (the benefit of HPV vaccination is much higher than the risk of an adverse event) [10], HCWs' communications with family members [5], and the recommendations of national academic associations.

Chi-square tests or Fisher's exact tests were conducted to evaluate differences in HCW recommendations by occupation and specialty. McNemar's test was performed to compare HCWs' recommendation of HPV vaccination after reading information sheets A and B using Stata Statistical Software ver. 14.0 (Stata Corp., College Station, TX, USA). This study was approved by the Institutional Review Board of Nara Medical University, Japan, with exemption of written consent (approval no. 2939).

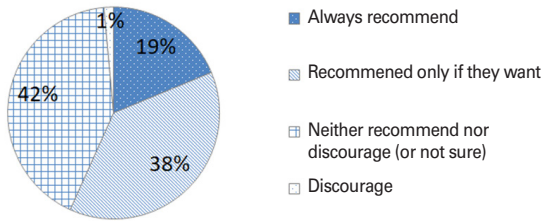
### Results

A total of 441 HCWs completed the questionnaire, of which 32% were physicians and 68% were nurses (Table 1). Of the response categories for HCWs recommendations regarding HPV vaccination for girls aged 12–16 years, 19% always recommended vaccination, 38% only recommended vaccination if the girls and their families requested it, 40% neither recommended nor discouraged vaccination (or were not sure), and 2% discouraged vaccination (Fig. 1). Their recommendations could be changed by an active recommendation of the HPV vaccine from the MHLW (61%), more safety reports in the media (35%), further recommendations from other healthcare workers (26%), and additional scientific evidence about the risks and benefits of HPV vaccination (34%). While 40% of HCWs recommended sex-neutral routine vaccination (for both males and females), 20% supported female-only routine vaccination, and 21% had no clear recommendation (neither recommended nor discouraged, or had no idea). Regarding the MHLW's recommendation of the HPV vaccine, 47% answered that the MHLW should actively recommend routine vaccination, and 32% had no idea. Among HCWs who read information sheets A and B, 36% and 49% always recommended vaccination, 39% and 33% recommended vaccination only if the girls and their families requested it, 25% and 18% neither recommended nor discouraged vaccination (or were not

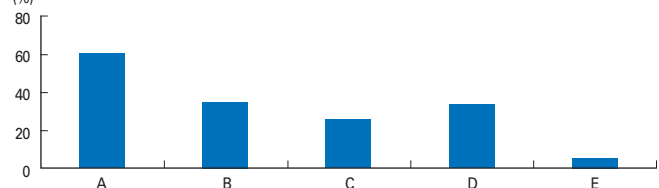
**Table 1.** The demographic background of the healthcare workers

Characteristic	No. (%)
Age (yr)	
<30	106 (25)
30–39	106 (25)
40–49	130 (31)
50–59	62 (15)
≥60	16 (4)
Occupation	
Physician	132 (32)
Nurse	286 (68)
Specialty	
Pediatrics	89 (21)
Obstetrics and gynecology	87 (21)
Internal medicine	98 (23)
Others	146 (35)
Healthcare facility	
University hospital	270 (65)
Community hospital	128 (31)
Clinic	18 (4)

Q1. What is your current explanation of HPV vaccination to girls 12–16 years and their family? (N=416)



Q2. What additional information can change your current recommendation in Q1? (multiple answers allowed) (N=418)

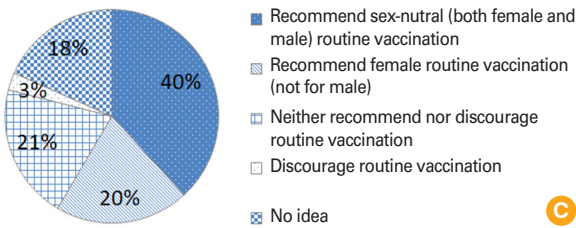


A

A: Active recommendation from MHLW. B: More safety report from mass media. C: More recommendation from healthcare workers. D: More scientific evidence about risk and benefit of HPV vaccine. E: No additional information changes my current recommendation

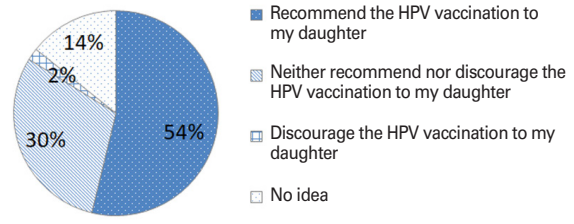
B

Q3. What is your recommendation about sex of routine vaccination? (N=419)



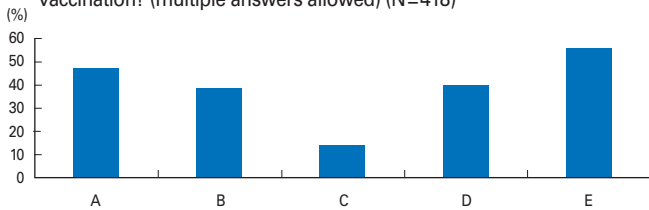
C

Q4. What is your recommendation for your child (if you had a daughter aged 12–16)? (N=420)



D

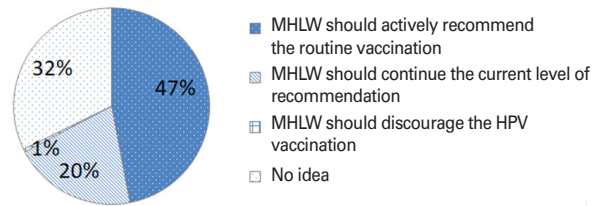
Q5. What is your influential source of information about the HPV vaccination? (multiple answers allowed) (N=418)



E

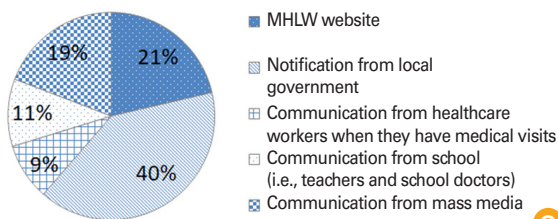
A: MHLW. B: National academic associations (i.e., Japan Pediatric Association). C: International organizations. D: Mass media. E: Others

Q6. What is your opinion about the recommendation of HPV vaccination from MHLW? (MHLW does not actively recommend the routine vaccination, but recommend the provision of information.) (N=419)



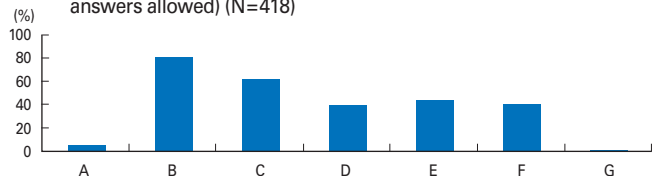
F

Q7. Which is the most effective way to provide the information about the HPV vaccination and their family? (N=417)



G

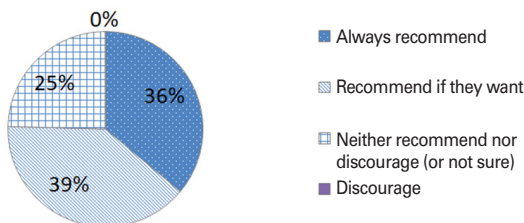
Q8. What is your opinion about the provision of information about the HPV vaccination from national mass media? (multiple answers allowed) (N=418)



H

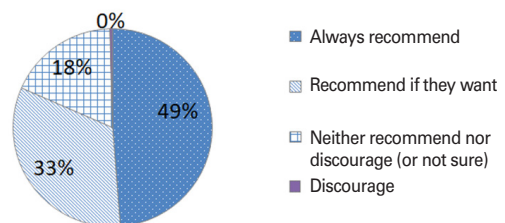
A: Overall, the information from mass media is accurate. B: There is a lack of accurate information about the benefit of the vaccination. C: There is a lack of accurate information about the risk of the vaccination. D: There is a lack of international information about the vaccination. E: There is a lack of provision of information about recommendation from national academic associations. F: There is a lack of provision of information about recommendation from MHLW. G: Others.

Q9. (optional). After reading the information (A) from MHLW, what is your current explanation of HPV vaccination to girls aged 12–16 years and their family? (N=244)



I

Q10. (optional). After reading the information (B), what is your current explanation of HPV vaccination to girls aged 12–16 years and their family? (N=244)



J

Fig. 1. (A–J) Questions and answers about human papillomavirus (HPV) vaccination recommendations. MHLW, Ministry of Health, Labour and Welfare.

# CLINICAL AND EXPERIMENTAL VACCINE RESEARCH

Hitomi Nishioka et al • A survey of HPV vaccine recommendation in Japan

sure), and 0% and 0% discouraged HPV vaccination, respectively. The rate of HCWs who answered “always recommend HPV vaccination” was higher after reading information sheet A compared to before reading either of the information sheets ( $p < 0.001$ : Q9 versus Q1). However, the rate of “always recommend” significantly improved after reading information sheet B compared with information sheet A ( $p < 0.001$ : Q10 versus Q9) (Table 2).

Fig. 2 shows that physicians were more likely to recommend HPV vaccination in their current practice than nurses (Q1,  $p < 0.001$ : active recommendation was 35% among physicians

versus 11% among nurses). HCWs from obstetrics and gynecology were more likely to actively recommend HPV vaccination than HCWs from other specialties ( $p = 0.045$ : 26% in obstetrics and gynecology versus 17% in other specialties) (Table 3). Sex-neutral vaccination was recommended by 64% of physicians and 26% of nurses (Q3,  $p < 0.001$ ). HCWs from obstetrics and gynecology recommended sex-neutral vaccination more than HCWs from other specialties ( $p < 0.001$ : 65% in obstetrics and gynecology versus 32% in other specialties) (Table 4).

**Table 2.** Influence of information A and B on actively recommending the HPV vaccine

The rate of HCWs who answered “always recommend the HPV vaccination”	Value
After reading information sheet A (Q9) (%)	36
Before reading either of the information sheets (Q1) (%)	19
p-value	<0.001
After reading information sheet B (Q10) (%)	49
After reading information sheet A (Q9) (%)	36
p-value	<0.001

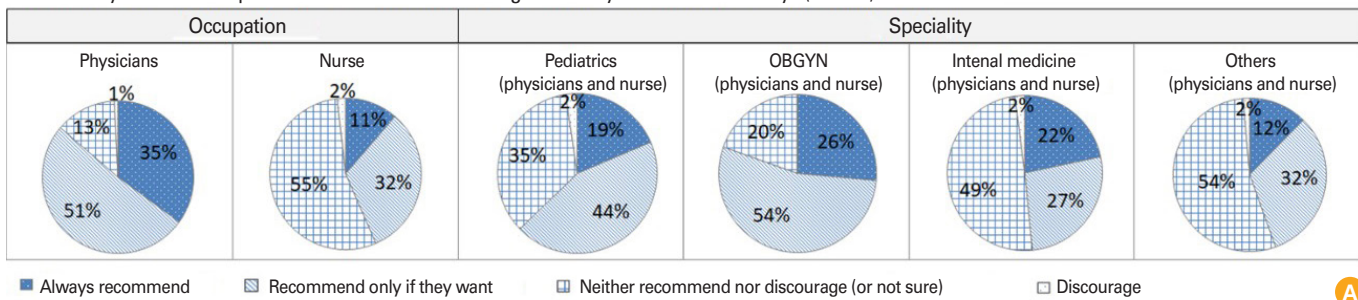
Values are presented as % or p-value.  
HPV, human papillomavirus; HCW, healthcare worker.

**Table 3.** Gaps in consciousness toward the HPV vaccine between physicians and nurses, and among clinical departments

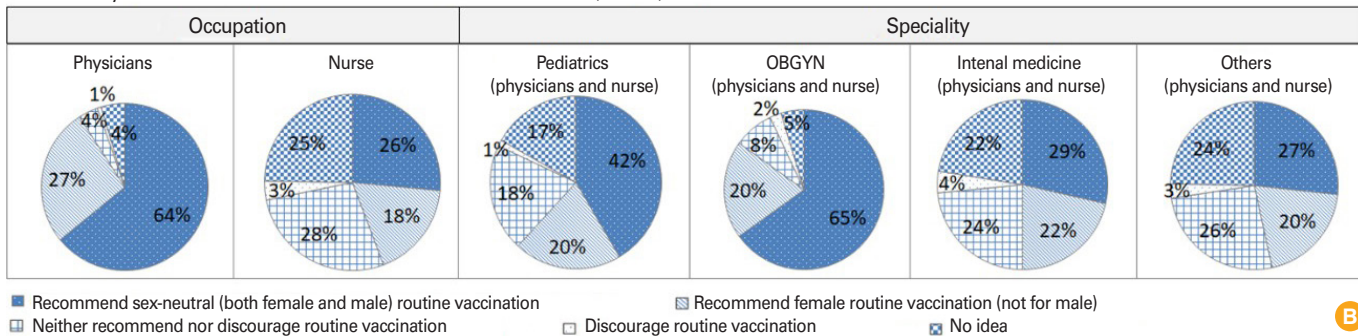
The rate of HCWs who answered “always recommend the HPV vaccination”	Value
Physicians (%)	35
Nurses (%)	11
p-value	<0.001
Obstetrics and gynecology (%)	26
Other specialties (%)	17
p-value	0.045

Values are presented as % or p-value.  
HPV, human papillomavirus; HCW, healthcare worker.

Q1. What is your current explanation of HPV vaccination to girls 12–16 years and their family? (N=416)



Q3. What is your recommendation about sex of routine vaccination? (N=419)



**Fig. 2.** Current explanation (Q1) (A) and sex-neutral vaccination (Q3) (B) by healthcare worker (HCW) occupation and specialty. OBGYN, obstetrics and gynecology; HPV, human papillomavirus.

**Table 4.** Gaps in the rate of HCWs who recommend sex-neutral routine vaccination between physicians and nurses, and among clinical departments

The rate of HCWs who answered "recommend sex-neutral routine vaccination"	Value
Physicians	64
Nurses	26
p-value	<0.001
Obstetrics and gynecology	65
Other specialties	32
p-value	<0.001

Values are presented as % or p-value.

HPV, human papillomavirus; HCW, healthcare worker.

## Discussion

This study highlights the current HPV vaccination recommendations from HCWs in Japan. Unfortunately, only 19% of HCWs always recommended HPV vaccination for girls aged 12–16 years old, with a large difference between physicians (35%) and nurses (11%). In light of such a difference in awareness between physicians and nurses, it is not surprising that there is an even greater difference between physicians and the general public. Compared to information sheet A, which descriptively explained the risks and benefits of HPV vaccination, information sheet B, which summarized studies of the causality between adverse events and vaccination, quantified the risks and benefits, outlined the importance of HCWs' communications with family members, and provided the recommendations of national academic associations, significantly improved the proportion of HCWs recommending HPV vaccination. In addition, there were significantly fewer HCWs neither recommending nor discouraging vaccination (or were not sure) after reading information sheet B compared with after reading information sheet A or before reading any information. Overall, the additional details in information sheet B likely contributed to improving HCWs' recommendation of HPV vaccination. A previous study providing information about HPV vaccination to parents showed that explaining how the benefits of the HPV vaccine outweigh the risks improved parental intentions to vaccinate their children [5]. Similarly, our study showed that informing HCWs also improved their vaccination recommendations.

In this study, a crucial factor for HCWs considering recommending HPV vaccination was an active recommendation from the MHLW. Another study conducted in a different jurisdiction in Japan reported that 90% of physicians agreed to

restart HPV vaccination for adolescents with the government's recommendation [7]. The 9-valent HPV vaccination, which has been approved for use in Japan, is expected to have a greater benefit with a compatible safety profile than the quadrivalent vaccine [11]. Given that national and international safety data are available and that risk and benefit analysis studies have been conducted [1–4,9,10,12], and finally in April 2022 the government resumed active recommendations, the next step toward improving HPV vaccination rates is to resume the active recommendation from the MHLW.

In addition, about 40% of HCWs in this study supported sex-neutral routine vaccination in Japan, while about 20% recommended that routine vaccination should be offered only to females. Some countries have initiated sex-neutral HPV vaccination programs [13]. Furthermore, several studies suggest that sex-neutral HPV vaccination is safe and beneficial, especially where the vaccine coverage rate for females is low [14,15]. The observation that HCWs from obstetrics and gynecology recommended a sex-neutral vaccination scheme more than other specialties may be because of their awareness of the negative impacts of HPV-related diseases (not only cervical cancer but also anogenital cancers and genital warts) and that HPV transmission from males can be prevented by vaccination. Given that Japan recently approved the HPV vaccination for males, a sex-neutral HPV vaccination scheme could also be considered.

There are a few limitations of this study. First, the study was conducted using a convenience sample. As such, selection bias is a possibility as we could not evaluate the survey's response rate. Since a university hospital led the study, it included physicians and nurses but did not include many other HCWs in clinics. However, the distribution of this study sample's demographic information, such as age and specialty, suggests the results may apply to the general HCW population who regularly see adolescent patients in Japan.

In conclusion, this study showed that the rate of HCWs who recommend HPV vaccination for adolescent girls remains low in Japan. However, the provision of evidence-based information, including details about the causality between adverse events and vaccination, quantifying the risks and benefits of the HPV vaccine, highlighting the importance of HCW's communications with family members, and providing the recommendations of national academic associations, could increase the proportion of HCWs recommending HPV vaccination. An active recommendation of HPV vaccination from the MHLW and introducing a sex-neutral routine vaccination

scheme were supported by a proportion of HCWs for improving HPV vaccination rates.

## ORCID

Hitomi Nishioka <https://orcid.org/0000-0003-4871-8495>

Tomoko Onishi <https://orcid.org/0000-0002-0199-7645>

Taito Kitano <https://orcid.org/0000-0003-0623-066X>

Masahiro Takeyama <https://orcid.org/0000-0002-9348-9815>

Natsuko Imakita <https://orcid.org/0000-0002-4684-3498>

Kei Kasahara <https://orcid.org/0000-0001-6431-7208>

Ryuji Kawaguchi <https://orcid.org/0000-0003-4740-9236>

Jennifer Akiko Masaki <https://orcid.org/0000-0003-2033-2785>

Keiji Nogami <https://orcid.org/0000-0002-2415-2194>

## References

1. Lei J, Ploner A, Elfstrom KM, et al. HPV vaccination and the risk of invasive cervical cancer. *N Engl J Med* 2020;383:1340-8.
2. Suzuki S, Hosono A. No association between HPV vaccine and reported post-vaccination symptoms in Japanese young women: results of the Nagoya study. *Papillomavirus Res* 2018;5:96-103.
3. Simms KT, Hanley SJ, Smith MA, Keane A, Canfell K. Impact of HPV vaccine hesitancy on cervical cancer in Japan: a modelling study. *Lancet Public Health* 2020;5:e223-34.
4. Larson HJ. Japan's HPV vaccine crisis: act now to avert cervical cancer cases and deaths. *Lancet Public Health* 2020;5:e184-5.
5. Mizumachi K, Aoki H, Kitano T, Onishi T, Takeyama M, Shima M. How to recover lost vaccine acceptance?: a multi-center survey on HPV vaccine acceptance in Japan. *J Infect Chemother* 2021;27:445-9.
6. Sawada M, Ueda Y, Yagi A, et al. HPV vaccination in Japan: results of a 3-year follow-up survey of obstetricians and gynecologists regarding their opinions toward the vaccine. *Int J Clin Oncol* 2018;23:121-5.
7. Katsuta T, Moser CA, Offit PA, Feemster KA. Japanese physicians' attitudes and intentions regarding human papillomavirus vaccine compared with other adolescent vaccines. *Papillomavirus Res* 2019;7:193-200.
8. Ministry of Health, Labour and Welfare. Human papillomavirus infection, cervical cancer and HPV vaccine, for healthcare workers [Internet]. Tokyo: Ministry of Health, Labour and Welfare; [date unknown] [cited 2021 May 19]. Available from: <https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou/kekkaku-kansenshou19/leaflet.html>.
9. Nara Medical University, Department of Pediatrics. HPV vaccine [Internet]. Kashihara: Nara Medical University; 2021 [cited 2021 May 19]. Available from: [https://www.naramed-u.ac.jp/~ped/pdf/cervical\\_cancer\\_vaccine.pdf](https://www.naramed-u.ac.jp/~ped/pdf/cervical_cancer_vaccine.pdf).
10. Kitano T. Stopping the HPV vaccine crisis in Japan: quantifying the benefits and risks of HPV vaccination in quality-adjusted life-years for appropriate decision-making. *J Infect Chemother* 2020;26:225-30.
11. Arbyn M, Xu L. Efficacy and safety of prophylactic HPV vaccines: a Cochrane review of randomized trials. *Expert Rev Vaccines* 2018;17:1085-91.
12. Van Damme P, Olsson SE, Block S, et al. Immunogenicity and safety of a 9-valent HPV vaccine. *Pediatrics* 2015;136:e28-39.
13. European Centre for Disease Prevention and Control. Guidance on HPV vaccination in EU countries: focus on boys, people living with HIV and 9-valent HPV vaccine introduction [Internet]. Stockholm: ECDC; 2020 [cited 2021 May 19]. Available from: <https://www.ecdc.europa.eu/sites/default/files/documents/Guidance-on-HPV-vaccination-in-EU-countries2020-03-30.pdf>.
14. Mikamo H, Yamagishi Y, Murata S, et al. Efficacy, safety, and immunogenicity of a quadrivalent HPV vaccine in Japanese men: a randomized, phase 3, placebo-controlled study. *Vaccine* 2019;37:1651-8.
15. Ng SS, Hutubessy R, Chaikyapapruk N. Systematic review of cost-effectiveness studies of human papillomavirus (HPV) vaccination: 9-valent vaccine, gender-neutral and multiple age cohort vaccination. *Vaccine* 2018;36:2529-44.