

RESEARCH ARTICLE

An Exploratory Study of Japanese Fathers' Knowledge of and Attitudes towards HPV and HPV Vaccination: Does Marital Status Matter?

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Abstract

Background: No studies on male attitudes towards HPV and HPV vaccination have been conducted in Japan, and little is known globally whether attitudes of single fathers differ to those living with a female partner. This exploratory study assessed whether Japanese fathers were likely to have their daughter vaccinated against HPV in a publically funded program and whether any differences existed regarding attitudes and knowledge about HPV according to marital status. **Materials and Methods:** Subjects were 27 fathers (16 single; 11 married) who took part in a study on HPV vaccine acceptability aimed at primary caregivers of girls aged 11-14 yrs in three Japanese cities between July and December 2010. **Results:** Knowledge about HPV was extremely poor (mean score out of 13 being 2.74 ± 3.22) with only one (3.7%) participant believing he had been infected with HPV and most (81.4%) believing they had no or low future risk. No difference existed regarding knowledge or awareness of HPV according to marital status. Concerning perceived risk for daughters, single fathers were significantly more likely to believe their daughter was at risk for both HPV (87.5% versus 36.4%; $p=0.01$) and cervical cancer (75.0% versus 27.3%; $p=0.02$). Acceptability of free HPV vaccination was high at 92% with no difference according to marital status, however single fathers were significantly more likely ($p=0.01$) to pay when vaccination came at a cost. Concerns specific to single fathers included explaining the sexual nature of HPV and taking a daughter to a gynecologist to be vaccinated. **Conclusions:** Knowledge about HPV among Japanese fathers is poor, but HPV vaccine acceptability is high and does not differ by marital status. Providing sexual health education in schools that addresses lack of knowledge about HPV as well as information preferences expressed by single fathers, may not only increase HPV vaccine acceptance, but also actively involve men in cervical cancer prevention strategies. However, further large-scale quantitative studies are needed.

Keywords: HPV vaccine - knowledge - attitudes - fathers - daughters

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Introduction

Persistent infection with an oncogenic human papillomavirus (HPV) is responsible for almost all cases of cervical cancer (de Sanjose et al., 2010; Li et al., 2011), and to a lesser extent cancer of the vagina, vulva, penis, anus and oropharynx (Kreimer et al., 2005; De Vuyst et al., 2009; Ferlay et al., 2010; de Martel et al., 2012). While both men and women are equally responsible for spreading the virus, the burden of HPV related disease is considerably higher in women, with around 570,000 HPV related cancer cases annually in women compared to only 34,000 in men (Arbyn et al., 2012). As a result,

much of the research on HPV awareness and knowledge has focused primarily on women (Waller et al., 2003; Oh et al., 2010; Gunasekaran et al., 2012; Hanley et al., 2012). Data on men's attitudes and knowledge is less common. However, one study demonstrated a five-fold increased risk of cervical cancer in women who had a male partner infected with penile HPV (Bosch et al., 1996). Furthermore, extramarital partners and number of lifetime partners in males is also associated with HPV detection and increased risk for cervical cancer in female partners (Zunzunegui et al., 1986; Burk et al., 1996). The World Health Organization (WHO) position paper on HPV vaccines states that these vaccines should be introduced

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as part of a coordinated prevention strategy for cervical cancer and other HPV-related diseases. It also states that the strategy should include education on risk-reducing behavior (World Health, 2009). Thus, given that the sexually transmitted nature of HPV implies recognition that sexual behavior in both men and women is a risk factor for cervical cancer, and, since most HPV infections in men are asymptomatic and screening of this population is not standard clinical practice, better outcomes for cervical cancer prevention programs may be achieved if men were actively included in HPV education and awareness campaigns.

Two highly effective prophylactic HPV vaccines have been developed that contain antigens against HPV types 16 and 18, responsible for around 70% of cervical cancer cases worldwide (Ault and Future, 2007; Paavonen et al., 2009). One vaccine, the quadrivalent vaccine, also contains antigens against HPV types 6 and 11 and affords high protection against genital warts (Garland et al., 2007). Because pre/adolescent girls are the primary target of HPV vaccination programs, understanding parental attitudes to HPV vaccination is essential. In Japan, free HPV vaccination became available from 2011 for girls aged 12-16yrs (Infectious Disease Surveillance Center, Immunization Schedule, 2011). While mothers are the primary decision-makers for children's healthcare in Japan, divorce or illness may result in fathers being the sole-caregiver. However, one US study on parental attitudes towards a herpes simplex virus type 2 (HSV-2) vaccine showed fathers were significantly more likely than mothers to refuse a vaccination for a disease that was sexually transmitted (Liddon et al., 2005).

Since no data exists on Japanese men's knowledge of and attitudes towards HPV and HPV vaccination and little is known globally about whether attitudes of single fathers differ to those living with a female partner, the aim of this exploratory study was to assess to what extent Japanese fathers of adolescent girls were likely to have their daughter vaccinated against HPV in a publically funded program and to investigate whether any differences exist regarding attitudes and knowledge about HPV, according to marital status.

Materials and Methods

Participants and procedure

Participants were 27 fathers who took part in a study of primary caregivers with adolescent daughters in school years 5-8 (ages 11-14yr) in two medium-sized (population 100,000) Japanese cities and one large city (population 2 million) in Northern Japan between July and December 2010. Details about the procedure have been reported elsewhere (Hanley et al., 2012), but in brief, a self-administered questionnaire, a stamp addressed envelope and a letter explaining the purpose of the study addressed to the primary caregiver were distributed through the schools and returned to the main investigator by post. The study was approved by the Ethics Review Board for Epidemiological Studies at Hokkaido University Graduate School of Medicine. Since the survey was both voluntary and anonymous, completing the questionnaire was taken

as consent to participate in the study.

Survey instrument and measures

A 103-item survey instrument was developed based on previous research on vaccine acceptability and adapted for a Japanese population (Dempsey et al., 2006; Fazekas et al., 2008). It assessed parental attitudes towards routine childhood vaccinations, socio-demographic factors (age, number of children, marital status, educational background, annual household income and disposable monthly income), knowledge about and attitudes towards cervical cancer, HPV and the HPV vaccination, and willingness to pay for HPV vaccine. To ensure primary caregivers had some understanding of the HPV vaccine, the following information was included: 'There are over 100 types of HPV that infect humans. Some types cause cancer (oncogenic HPV) and other types that do not. The oncogenic types of HPV that are responsible for causing cervical cancer are mainly transmitted by sexual intercourse. Two new vaccines (HPV vaccine) have been developed that prevent infection with the two most oncogenic HPV types. It is estimated that these vaccines can prevent up to 70% of all cervical cancers. One vaccine also protects against the two most common HPV types that cause genital warts. It is estimated that this vaccines can prevent around 95% of new cases of genital warts'.

HPV vaccine acceptability

Since national funding was not available for the HPV vaccine at the time of the study, vaccine acceptability was assessed by examining intentions to vaccinate if the vaccine was free, or if participants had to pay the minimum recommended price of ¥40,000 (around US\$400). Intention to vaccinate when free was assessed by the question: 'If your daughters could have the HPV vaccine for free, how likely would you be to have her vaccinated'. Responses were on a 5-point scale ('very unlikely', 'unlikely', 'not sure', 'likely', 'very likely'). Willingness to pay for HPV vaccination was measured by the question, 'What is the most you would be willing to pay out of pocket to have your adolescent daughter vaccinated against HPV'. Responses were on an 8-point scale: 'Nothing', '¥100-1,999', '¥2,000-4,999', '¥5,000-9,999', '¥10,000-19,999', '¥20,000-29,999', '¥30,000-39,999' and '¥40,000 or more'.

Knowledge and attitudes regarding HPV and HPV vaccine

To measure knowledge about HPV, we used 13 questions adapted from previous research (Dempsey et al., 2006; Fazekas et al., 2008). Questions included ten true-false statements and three composite questions about symptoms of HPV, consequences of untreated HPV and risk for HPV infection.

To assess participants' attitudes toward HPV and HPV vaccination, questions based on five concepts from the Health Belief Model (HBM) (Maiman et al., 1977) perceived susceptibility to HPV infection; perceived severity of HPV infection; perceived benefits of HPV vaccination; perceived barriers to HPV vaccination and cues to action for HPV vaccination, such as recommendation from a doctor or local health board,

were used. The HBM postulates that health behavior is determined by personal beliefs or perceptions about a disease, as well as the strategies available to reduce its occurrence, and has been used in several studies on HPV vaccine acceptability (Dempsey et al., 2006; Fazekas et al., 2008; Marlow et al., 2009). Perceived benefits and barriers were assessed with questions on vaccine efficacy and safety.

Statistical analysis

Data were analyzed using IBM SPSS Statistics Version 20.0 (SPSS Inc., Chicago, USA). Fathers indicating 'likely' or 'very likely' to have their daughter vaccinated were classified as 'acceptors', and those answering 'very unlikely', 'unlikely' or 'not sure' were classified as 'non-acceptors'. Bivariate analyses using Pearson's chi-squared and Fisher's exact test for categorical variables and Mann-Whitney U test for continuous variables were used to compare differences in attitudes and knowledge about HPV and HPV vaccine between fathers who were married or cohabiting (hereafter referred to as 'married') and those who were divorced, widowed or separated (hereafter referred to as 'single'). Due to the small number of non-acceptors and small sample size, multivariable logistic regression was not performed. Statistical significance was defined as a 2-tailed p-value of <0.05.

Results

Socio-demographics

Background characteristics of participants are shown in Table 1. The majority of participants were aged between 40 and 49 yrs (mean age 44.85 yrs±6.13), single (59.3%), did not have a university degree (55.5%) and had a disposable monthly income of <30,000 yen (\$300). There were no statistically significant differences in socio-economic factors, including marital status, between those fathers willing to have their daughter vaccinated and those who were not.

Knowledge about HPV

While 37% of fathers stated they had heard of HPV, accurate knowledge about HPV infection was poor (mean score out of a possible 13 was 2.74±3.22), and no significant difference was found with regards to marital status (Table 3). As shown in Table 2, only 18.5% of participants could correctly name the risk factors for HPV infection and only 7.4% knew the symptoms. For most questions, the most common answer was 'don't know' (data not shown). Furthermore, even though participants were actually told in the questionnaire that HPV causes cancer and a vaccine had been developed that prevent infection with the two most oncogenic types that cause cervical cancers, only 37.7% correctly answered that HPV was indeed the cause of cervical or any other cancer. However, despite overall knowledge being poor, 66.7% of participants did indicate that they would like more information on HPV (Table 3).

Awareness of and attitudes towards HPV and HPV vaccination

Only one (3.7%) participant believed he had been previously infected with HPV and most (81.4%) believed they had absolutely no or low future risk of infection. There were no significant differences according to marital status (Table 3). However, with regards to their adolescent daughter's future risk for HPV infection, single fathers were significantly more likely to admit their daughters had a medium to high future risk compared to fathers living with a female partner (87.5% and 36.4%, respectively; p=0.01). Similarly, they were also more likely to believe their daughters was at risk for cervical cancer (75.0% and 27.3%, respectively; p=0.02).

While only half (51.9%) had heard of the HPV vaccine, 92.5% of father's were willing to vaccinate their daughter if offered for free. Although there was no statistical difference according to marital status, all (100%) single fathers stated they would have their daughters vaccinated in a publically funded HPV vaccination program. Single fathers were also significantly more likely to be willing to pay more for the vaccine (p=0.01), when vaccination came at a cost (Table 3). While most fathers (63.3%) stated they would use the internet as the first place to go for more

Table 1. Selected Characteristics of the Sample Population and HPV Vaccine Acceptance

Characteristic	Overall N (%)	Acceptors N (%)	Non-Acceptors N (%)	p-value
Age (yr)				
29-39	5 (18.5)	4 (80.0)	1 (20.0)	
40-49	16 (59.3)	15 (93.8)	1 (7.2)	
>50	6 (22.2)	6 (100.0)	0 (0.0)	0.26
Marital Status				
Married/cohabiting	11 (40.7)	9 (81.8)	2 (18.2)	
Separated/divorced/widowed	16 (59.3)	16 (100.0)	0 (0.0)	0.16
Education				
Less than university	15 (55.5)	14 (93.3)	1 (6.7)	
University or more	12 (44.5)	11 (91.7)	1 (8.3)	1.00
Annual Household Income (yen) ^a				
<5 million	12 (44.4)	12 (100.0)	0 (0.0)	
5-<7 million	11 (40.7)	9 (81.8)	2 (18.2)	
>7 million	4 (14.9)	4 (100.0)	0 (0.0)	0.17
Monthly Disposable Income (yen)				
<30,000	16 (59.3)	14 (87.5)	2 (12.5)	
>30,000	11 (40.7)	11 (100.0)	0 (0.0)	0.50

Table 2. Fathers' Knowledge about HPV

Statement ^a	Correct Response Overall n (%)
HPV is the virus that causes herpes (F)	4 (14.8)
Genital warts are caused by some types of HPV (T)	7 (25.5)
HPV is the virus that causes cervical cancer (T)	10 (37.7)
Pap smears prevent disease caused by HPV (T)	13 (48.1)
If a women has a normal Pap smear, she doesn't have HPV (F)	8 (29.6)
Changes in a Pap smear may indicate a woman has HPV (T)	11 (40.7)
Genital warts are caused by the herpes virus (F)	3 (11.1)
HPV can cause cancer (T)	10 (37.7)
Pap smears will almost always detect HPV (F)	5 (18.5)
HPV can be passed from mother to child during childbirth (T)	3 (11.1)
Risk factors for HPV infection ^b	5 (18.5)
Symptoms of HPV infection ^c	2 (7.4)
Consequences of untreated HPV infection ^d	9 (33.3)

^aT:True, F:False, ^bCorrect if respondent marked two of three correct responses (sex before age 16, many sexual partners, or partner with many sexual partners), ^cCorrect if respondent marked two of three correct responses (warts that sometimes itch or bleed, warty growths, or no symptoms), ^dCorrect if respondent marked four of six correct responses (cancer, dysplasia, unable to give birth, warts, no consequences, or death)

Table 3. Fathers' Awareness of and Attitudes Towards HPV and HPV Vaccine According To Marital Status

	Overall		Marital status		p value	Overall N (%)	Marital status		p value
	Mean (SD)	N (%)	Married Mean (SD)	Single Mean (SD)			Married N (%)	Single N (%)	
HPV knowledge score	2.74 (3.22)	2,56 (3.31)	3.00 (3.31)	2.56 (3.31)	0.74	7 (25.9)	Price willing to pay for vaccination (yen)a		
Heard of HPV							100-1,999		
Yes	10 (37.0)	4 (36.4)	6 (37.5)			7 (25.9)	2,000-4,999		3 (18.8)
No	15 (55.6)	6 (54.5)	9 (56.2)			7 (25.9)	5,000-9,999		1 (9.1)
Don't Know	2 (9.4)	1 (9.1)	1 (6.3)		1.00	10 (37.7)	10,000-19,999		5 (31.3)
Believe may have had a previous HPV infection						1 (3.7)	20,000-29,999		0 (0.0)
Yes	1 (3.7)	1 (9.1)	0 (0.0)			1 (3.7)	30,000-39,999		1 (6.3)
No	14 (51.9)	7 (63.6)	7 (43.8)			0 (0.0)	>40,000 yen (current price)		0 (0.0)
Don't Know	12 (44.4)	3 (27.3)	9 (56.3)		0.10	1 (3.7)	Preferred age for vaccination (yrs)		0 (0.0)
Beliefs about future risk of HPV Infection						1 (3.7)	0-9		1 (6.3)
Absolutely no risk	11 (40.7)	5 (45.5)	6 (37.5)			20 (74.1)	10-13		11 (68.8)
Low risk	11 (40.7)	5 (45.5)	6 (37.5)			6 (22.2)	15-18		4 (25.4)
Medium to high risk	5 (18.5)	1 (9.1)	4 (25.0)		0.21	21 (77.8)	HPV vaccine is effective against HPV		12 (75.0)
Perceived threat to one's health from HPV infectionb						6 (22.2)	Yes		4 (25.0)
None to low	4 (15.4)	2 (18.2)	2 (13.2)			13 (48.1)	No/Don't know		7 (43.8)
Medium to very high	22 (84.6)	9 (81.8)	13 (86.7)		0.74	14 (51.9)	Believe HPV vaccine is safe		9 (56.2)
Would like more information on HPV						8 (29.6)	Yes		11 (68.8)
Yes	18 (66.7)	7 (63.6)	11 (68.8)			19 (70.4)	No/Don't know		5 (31.2)
No/No preference	9 (33.3)	4 (36.4)	5 (31.3)		1.00	18 (66.7)	Believe HPV vaccine has serious side effects		11 (68.8)
Beliefs about daughter's future risk for HPV infection						9 (33.3)	Yes		5 (31.3)
No risk to low risk	18 (66.6)	4 (36.4)	14 (87.5)		0.01**	18 (66.7)	No/Don't know		5 (31.3)
Medium to high risk	9 (33.3)	7 (63.6)	2 (12.5)			9 (33.3)	Desire more information on HPV vaccine		1.00
Beliefs about daughter's future risk for cervical cancer						17 (63.3)	Yes		9 (56.3)
No risk to low risk	12 (44.4)	8 (72.2)	4 (25.0)		0.02*	5 (18.5)	No/No preference		4 (24.0)
Medium to high risk	15 (55.6)	3 (27.3)	12 (75.0)			4 (14.8)	First place to go for more information		1 (12.5)
Heard of vaccine to prevent cervical cancer						1 (3.7)	Internet		1 (6.3)
Yes	14 (51.9)	5 (45.5)	9 (56.3)		0.67	9 (33.3)	Medical professional		0.57
No	10 (37.0)	5 (45.5)	5 (31.3)			17 (63.3)	Book		9 (56.3)
Don't Know	3 (11.1)	1 (9.0)	2 (12.5)			5 (18.5)	Helpline		4 (24.0)
Willing to vaccinate if free						4 (14.8)	Recommendation from a doctor		1 (12.5)
Yes	25 (92.5)	9 (81.8)	16 (100)			1 (3.7)	Will encourage intention to vaccinate		1 (6.3)
No/ Don't know	2 (7.4)	2 (18.2)	0 (0.0)		0.16	9 (33.3)	Will have no effect on intention to vaccinate		7 (43.8)
						18 (66.7)	Recommendation from the local health board		9 (56.3)
						10 (37.7)	Will encourage intention to vaccinate		9 (56.3)
						17 (63.0)	Have no effect/discourage intention to vaccinate		7 (43.6)

*p<0.05; **p<0.01; *100yen = \$1.00

information on the HPV vaccine, more single fathers reported they would consult a health professional (24.0%) compared to married fathers (9.1%). Recommendation from the local health board would also significantly increase acceptance in single fathers ($p=0.02$). No differences were found regarding perceptions of vaccine efficacy and safety.

Concerns specific to single fathers

At the end of the questionnaire, participants were given the opportunity to write any comments or concerns they had about the vaccine. One single father wrote, "I have a 14yr old daughter, I want her to be vaccinated but I am a man. I can't take her to the gynecologist and she says she is too old for a pediatrician. I wish she could be vaccinated in school". Similarly, another father said, "I have one daughter. She is 13yrs old. I will pay anything so she doesn't get cancer like her mother. But if HPV is transmitted sexually, how can I talk to her about the vaccine? I am a man. I want her school to provide more education about the vaccine". One other father who lost his wife to breast cancer also wrote, "I have 3 daughters, aged 12, 15 and 17yrs. My wife died of cancer. I don't want my girls to get cancer. But I can't afford 15,000 yen per dose to vaccinate all my daughters. Please try and persuade the government to fund the vaccine". Most of the single fathers in this study who were widowed had lost their wife to cancer and while they all wanted to protect their daughters from cervical cancer, they expressed a sense of frustration at the hurdles facing them.

Discussion

No data exists on Japanese men's knowledge of and attitudes towards HPV and HPV vaccination, and little is known globally about whether attitudes of single fathers towards vaccinating their adolescent daughters against HPV differ to those living with a female partner. To address this gap in knowledge we carried out an exploratory study of 27 Japanese fathers with daughters aged 11-14yrs.

Compared to one Honduran study (Perkins et al., 2012) and one German study (Kuznetsov et al., 2012) where 22% and 29% of fathers, respectively, had heard of HPV, awareness in this study was slightly higher at 37%, but considerably lower than a recent Italian study where 77% of fathers had heard of HPV (Pelucchi et al., 2010). Higher education level in the Italian study is suggested to be one of the reasons for the difference. However in both the present study and the Italian paper just over 40% of fathers had a university education, so this difference in awareness may reflect the lack of education about HPV and cervical cancer at all levels of the Japanese education system. One other reason for the difference may be the way in which the HPV vaccine has been promoted in Japan. Unlike in several European countries where the vaccine has been promoted as an 'HPV vaccine against cervical cancer', at the time of the study, only the bivalent vaccine was licensed in Japan and promoted mainly as a "vaccine against cervical cancer". This may also explain why considerably more fathers (52%) were aware of a

vaccine to prevent cervical cancer rather than the actual virus (37%) that causes it.

We found that men greatly underestimated their own past and future risk for HPV infection, particularly since 60% of them were single. Similar results have been reported in the US (McPartland et al., 2005) and Europe (Verhoeven et al., 2006). In contrast, one Japanese survey conducted by the Japan Broadcasting Corporation (NHK) found that 11% of Japanese men aged 16-69yrs had more than one sexual partner in the past year and of those 52% were in sexual relationships with several partners simultaneously. Furthermore, 12% of married men stated they had extramarital sex within the past year, with a further 20% declining to answer (NHK, 2002). One Indian study also reported that for women with only one lifetime sexual partner, premarital and, in particular, extramarital relationships in their husband, increased their risk of cervical cancer by up to 6.9-fold (Agarwal et al., 1993). Until now, cervical cancer prevention strategies in Japan have focused solely on women with secondary prevention in the form of screening using cervical cytology, and from 2011 with cytology and high-risk HPV testing for low grade abnormality triage. However, now that primary prevention has become possible with the development of two HPV vaccines, and given that the sexually transmitted nature of HPV implies recognition that sexual behavior in both men and women is a risk factor for cervical cancer, along with the fact that HPV does also cause cancer in men, Japanese men need to be actively involved in future HPV education and awareness campaigns as a strategy for cervical/cancer prevention, and preferable before they reach adulthood.

While no difference existed regarding personal susceptibility to HPV infection and marital status, when it came to perceived risk for participant's adolescent daughter, single fathers were significantly more likely to perceive a risk, and that risk was similar to perceived risk reported by mothers in the same study (Hanley et al., 2012). This suggests that being the parent who shoulders most of the responsibility for their child's healthcare rather than the gender of the parent is a determining factor for admitting a child's susceptibility to a virus that is sexually transmitted or to illness in general, and may also explain why fathers in the study by Liddon et al. were less likely than mothers to accept the HSV-2 vaccine (Liddon et al., 2005).

Despite limited knowledge and awareness about HPV, fathers' acceptance of the HPV vaccine was high (92%) and comparable to that of mothers (Hanley et al., 2012) in the same study. It was also similar to fathers in Honduras (94%) (Perkins et al., 2012) and considerably higher (65%) than the Italian study (Pelucchi et al., 2010), indicating that father's awareness of HPV is not a measure of HPV vaccine acceptance. While all single fathers in both the present and Honduran study indicated they would vaccinate their daughter against HPV, our study did highlight some issues specific to these fathers, such as talking about the sexual nature of HPV or place of vaccination, that need to be addressed. Japan has no school-based childhood vaccination program and there is also no general practitioner (GP), so in most cases

pediatricians are the primary health care provider for children. However, several studies have shown that girls of mothers who attend a gynecologist regularly are more likely to be vaccinated against HPV (Chao et al., 2009; Lefevre et al., 2011; Hanley et al., 2012). Since gynecologists may be more active in recommending (to a mother) that a child be vaccinated against a disease they see on a daily basis, single fathers, particularly of older adolescent girls, may be missing out on the counseling they need or desire. Providing adequate education about HPV to both sexes in schools would not only help resolve this issue, but also involve men in cervical cancer prevention strategies. In the absence of school-based education, Japanese pediatricians need to be more aware of the potential issues facing single fathers of adolescent girls with regards to HPV vaccination, as well as providing guidance about the ongoing need for cervical screening in future years.

The results of this exploratory study need to be interpreted with a great deal of caution because the sample size was very small and, while socioeconomically diverse, cannot be taken as representative of the general population. Furthermore, we investigated intention to vaccinate which might overestimate actual uptake since external barriers such as having to take time off work (particularly difficult for Japanese men), three times over a six month period may be great. Nevertheless, we have identified some potentially important issues concerning Japanese men's lack of knowledge about HPV, as well as problems unique to single fathers with adolescent daughters regarding HPV vaccination. As a result, we have provided a useful starting point for further larger-scale quantitative research to assess HPV awareness in Japanese men, as well as HPV vaccination uptake in girls of single fathers at the population level.

In conclusion, while knowledge about HPV among Japanese fathers is poor, HPV vaccination acceptability is high and does not differ by marital status. Providing adequate sexual health education in schools that addresses lack of knowledge about HPV as well as information preferences expressed by single fathers, may not only increase HPV vaccine acceptance, but will also actively involve men in cervical cancer prevention strategies. However, further large-scale quantitative studies are needed.

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