

Human papilloma virus (HPV)-related information acquisition and seeking behavior among infected women: A single center cross-sectional survey in Shanghai, China

Xiehua Yuan¹, Linlin Lu¹, Ruhe Jiang¹, Yue Yu², Jing Zhou^{1,3,4}, Ling Wang^{1,3,4,*}, Yan Du^{1,3,*}

¹Obstetrics and Gynecology Hospital, Fudan University, Shanghai, China;

²Eight-year Clinical Medicine Program, Shanghai Medical College, Fudan University, Shanghai, China;

³The Academy of Integrative Medicine of Fudan University, Shanghai, China;

⁴Shanghai Key Laboratory of Female Reproductive Endocrine-related Diseases, Shanghai, China.

Abstract: Lacking of adequate knowledge is an obstacle to effective prevention of cervical cancer, yet factors that affect the information acquisition and seeking behavior as well as the information communication process are not well studied. We assessed information acquisition and seeking behavior, as well as perceived barriers of doctor-patient communication regarding human papilloma virus (HPV)-related information of infected women. Among 437 participants, 405 (93%) expressed demands for HPV-related information, while only a small proportion (100/437, 22.9%) actively sought information and felt obstacles comprehending. Web-based channels were most frequently utilized and medical personnel were the most trusted information source. Patients' satisfaction was significantly correlated with doctor's patience ($r = 0.581$, $p < 0.001$) and emotional caring ($r = 0.555$, $p < 0.001$). Compared to patients not actively seeking information, those actively seeking information were more likely to be single ($p = 0.005$), had higher education ($p = 0.009$) and monthly individual-level income ($p = 0.023$), and was more likely to undergo regular cervical cancer screening ($p = 0.003$), and were already or willing to be vaccinated ($p = 0.008$). The actively seeking information group also achieved higher scores in HPV knowledge test ($p = 0.007$). Public health interventions targeting HPV-infected women using specifically designed educational materials may influence information seeking behavior, increase HPV literacy and knowledge, which could potentially increase HPV vaccine uptake and cervical cancer screening rate.

Keywords: HPV infection, information acquisition, health communication, cervical cancer, prevention

Introduction

Worldwide, cervical cancer ranks fourth of gynecologic malignancies among women and is a major cause of premature death (1). Approximately 95% of the cervical cancer cases are caused by chronic infection with certain types of carcinogenic human papillomavirus (HPV) (2). However, it is well recognized that first and secondary prevention are effective in preventing cervical cancer (2). Invasive cervical cancer can be prevented by HPV vaccination (2). Screening and removing precancerous lesions can prevent its further development into cervical cancer (2). In addition to health care accessibility and affordability (3), lacking of adequate knowledge is also an obstacle to the effective prevention of cervical cancer. It has been shown that worldwide women diagnosed with cervical intraepithelial neoplasia (CIN) do not have adequate knowledge about their disease, which affects their self-care ability as well as creates psychological

stress (4). The burden of HPV-related health issues on the individual, family and society cannot be ignored. Therefore, it is important to precisely target high risk population and efficiently allocate health resource so as to achieve effective prevention and eventually improve women's health.

The importance of HPV-related information acquisition and dissemination

Health communication is crucial in primary and secondary prevention. Women with HPV infection are the vulnerable population that should be the major target of health communication and intervention. However, previous studies in developing countries mainly focused on the knowledge level and psychological evaluation of women infected with HPV (5-7), few have studied their information source, information seeking behavior, and how they comprehend and perceive the communication

and management of information by healthcare providers.

Identifying the factors that influence information acquisition and seeking behavior, as well as information dissemination processes, is critical to effectively communicate the correct HPV-related information to improve HPV vaccination and screening rates. This cross-sectional survey study was conducted to assess information acquisition and seeking behavior, as well as perceived barriers of doctor-patient communication regarding HPV-related information of infected women using a structured questionnaire (Supplementary Material, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>) at Obstetrics and Gynecology Hospital of Fudan University in Shanghai, China from July to October of 2019. The study protocol conformed to the ethical guidelines of the 2000 Declaration of Helsinki and was approved by the institutional review board at the hospital.

HPV-related information acquisition behavior

Overall, a total of 437 participants were included. Demographic characteristics and basic health status of the participants are presented in Supplemental Table S1 (<https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>). The majority of the surveyed women considered themselves as either not having any knowledge (74/437, 16.9%) or limited knowledge (227/437, 51.9%) about HPV-related information. However, almost 93% (405/437) of the women expressed their demands for HPV-related knowledge (Supplemental Table S2, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>). Patients in general were interested in all aspects of HPV-related information, with "treatment strategies", "prevention strategies", and "symptoms after infection" obtaining more than 300 hits (Supplemental Figure S1, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>).

Among 437 women participated, 100 (22.9%) of them actively searched information before 1st visit to the cervical clinic, while the majority (321/437, 73.5%) acquired some information passively. The trusted information source was evaluated using multiple choice questions with maximum of three options. Medical personnel ($n = 369$) was the most trusted source of information, followed by hospital WeChat (a popular social media app in China, which combines the functions of Facebook and Twitter) official account ($n = 271$); while radio ($n = 13$), community personnel ($n = 20$), and newspapers and magazines ($n = 45$) were the least trusted information source (Supplemental Figure S2, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>). It is not surprising that our study showed that medical personnel were the most trusted information source, since our population is a group of HPV-infected women seeking medical treatment at a tertiary hospital.

Our study also showed that the credibility of the community resources was not well perceived, despite China's effort to improve the basic health infrastructure at the community level. A study from Jiangsu, a relatively rich province located at the east coast of China, reported that although substantial investments (human resources, materials, and financial) have been made to improve community health resources, the return is low (8). Community involvement is essential in cervical cancer prevention (9), and should be the forerunner of public health campaigns. However, in economically developed regions of China, patients tend to come to tertiary hospitals for primary health care instead of utilizing community health resources. It is crucial to appropriately educate patients, refine the referral system and increase the utilization of health care services at the community level, thus reducing the burden of tertiary hospitals.

Notably, fifty (11.4%) women expressed that they once had information avoidance behavior, and the common reasons for such behavior were: "knowing this information will cause anxiety" and "the information is too mixed and it is difficult to distinguish the truth". Among those patients ($n = 100$), 45 patients were not very sure about finding the right information, while 42 patients expressed a neutral level of assurance (Supplemental Table S3, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>). We further explored possible barriers, and found that major obstacles included information channels and information source credibility. Patients in general thought that there were obstacles when they actively seeking information (average score = 2.88) (Supplemental Table S4, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>). The most frequently used information channels were search engines and hospital WeChat official account, while the least used channels were seminars and community personnel (Supplemental Table S5, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>). This result is in line with the rapid development of information technology and corresponding information behavior change occurring in the Chinese society. Therefore, designing health educational materials should base on target's web-based health information seeking behaviors. It is helpful to understand how patients evaluate and choose the sources and more importantly, how they perceive their credibility and reliability (10).

Doctor-patient communication

Less than half (200/437, 45.8%) of the patients reported that they had around 4-5 min per visit to communicate with their doctors, which is acceptable at a tertiary hospital in China (11). The average score of patient satisfaction of the communication was 3.36, which was between neutral and relatively satisfied (Supplemental Table S6, <https://www.globalhealthmedicine.com/site/>

supplementaldata.html?ID=76). In general, the patients were satisfied with the doctor-patient communication.

We further evaluated the doctor-patient communication from three aspects: experience, effectiveness, and expectations (doctor behaviors that patients cared about) (Table 1). In general, the participants assessed their communication experience towards positive (average score all above 3). In terms of communication effectiveness, the average scores of cognitive, emotion, and behavior were all above 3, indicating a positive attitude. Especially for the behavior item, 315 (72%) participants chose completely accept treatment or preventive measures as recommended by the doctor. Overall, patients were concerned about doctors' behaviors during communication. The item they cared most was the tone; followed by facial expression, eye contact, and body language; and how the doctors ask questions. The correlation analysis showed that patient satisfaction of doctor-patient communication was significantly correlated with all aspects of communication experience, effectiveness, and expectation. Specifically, correlation coefficients indicated that there were relatively strong correlations with "during communication, the doctor was patient with me" and "during communication, the doctor cared about my feelings and emotions" (Supplemental Table S7, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>). Our results have suggested that patients' satisfaction was significantly correlated with doctor's patience and emotional caring, indicating possible improvement areas for interventions. Besides information materials, we should also take into account psychological factors such as patients' emotions and doctors' behaviors which will influence patients. In addition to improve doctor's communication skills, it is also of great importance to increase patient's health information literacy especially eHealth literacy (12), so precious time could be effectively spent in discussing more important issues.

It is found that the most frequently chosen channel by the patients in a hospital setting was WeChat official

account (197 hits), followed by educational videos at the waiting area (182 hits); other frequently chosen channels included posters (162 hits), leaflets and brochures at the outpatient clinic (149 hits) (Figure 1). This time window (waiting period) should be used for efficient dissemination of cervical cancer and HPV related health educational materials. Qualified community health workers can come to the hospital and provide intervention (health education) for HPV-infected women during their waiting time, which could also greatly reduce the burden of tertiary hospitals and doctors, and facilitate doctor-patient communication. What is more, the educational materials should be concise and easy to understand for the lay population (13).

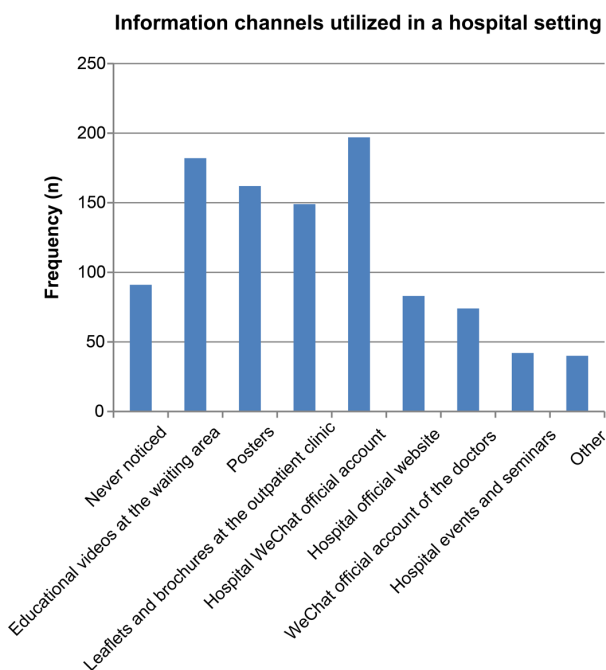


Figure 1. Information channels utilized in a hospital setting.

Table 1. Experience, effectiveness and expectation of doctor-patient communication (n = 437)

Item	Range	Mean ± SD
Experience		
The doctor communicated with me in a way that I could understand.	1-5	3.64 ± 1.01
During communication, the doctor cared about my feelings and emotions.	1-5	3.51 ± 1.04
The doctor fully explained the treatment plan.	1-5	3.56 ± 1.02
During communication, the doctor was patient with me.	1-5	3.49 ± 1.02
Effectiveness		
The communication helped me understand the information. (Cognitive)	1-5	3.67 ± 0.98
The communication alleviated my panic and stress. (Emotion)	1-5	3.61 ± 1.00
Would accept treatment or preventive measures of HPV as recommended by the doctor. (Behavior)	1-5	3.65 ± 0.61
Expectation		
Duration of time doctor spent in communication.	1-5	3.71 ± 0.98
How doctors ask questions.	1-5	3.91 ± 0.87
The doctors' tone during communication.	1-5	4.00 ± 0.89
The doctors' facial expression, eye contact, and body language, etc.	1-5	3.94 ± 0.94

Knowledge level, common misconceptions and attitudes

The following four aspects of HPV-related knowledge level were evaluated: general knowledge (Questions E1-6), risk factors (Questions E7-8), preventive measures (Questions E9-11), and HPV vaccine knowledge (Questions E12-13). The average score of the knowledge level was 6.48 ± 3.35 (range: -1 to 13). Our study found several common HPV misconceptions, which included "Q-E3. Most HPV infected persons have no symptoms (correct answer: Yes)", "Q-E9. Quit smoking and alcohol can prevent HPV infection (correct answer: Yes)", "Q-E11. There is effective drug treatment (correct answer: No)", and "Q-E12. Vaccine is still protective for those tested HPV positive (correct answer: Yes)" (Supplemental Figure S3A, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>). Those misconceptions may hinder doctor-patient communication and should be corrected before their meeting with the doctors. The attitudes towards vaccination (Questions E14-16) and screening (Question E17) are shown in Supplemental Figure S3B (<https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=76>). Studies of HPV literacy were mainly conducted in the United States, which have reported low to moderate HPV literacy (14-15). Despite

differences in the study population and measurements of information literacy, our results were consistent, suggesting the urgency of improving HPV literacy.

Comparisons of patients with different information acquisition behaviors

We found that patients who actively seeking information had higher education level and monthly income, and were more likely to be single ($p < 0.05$ for all) (Table 2). This group of patients also had a higher percentage of undergoing regular screening ($p = 0.003$) and were already or willing to be vaccinated against HPV ($p = 0.008$) (Table 2). In addition, those patients achieved higher scores in knowledge question test ($p = 0.007$). In contrast, information seeking behavior was not associated with knowledge demands, or doctor-patient communication (Table 3).

Statistics have shown a rising trend of cervical cancer mortality rate among younger Chinese women (16). However, the vaccine coverage rate in China is low. A multicenter study of Chinese female college students showed that only 11% of the 4220 surveyed were vaccinated against HPV, and only more than half of those not receiving HPV vaccine expressed willingness (17). Furthermore, despite implementation of cervical

Table 2. Comparison of basic characteristics and health status between actively seeking information group and the other group ($n = 437$)

Variables	Active ($n, \%$) $n = 100$	Not active ($n, \%$) $n = 337$	p value
Age (years)			0.257
< 30	27 (27.0%)	83 (24.6%)	
31-40	45 (45.0%)	140 (41.5%)	
41-50	17 (17.0%)	88 (26.1%)	
≥ 51	11 (11.0%)	26 (7.7%)	
Education level			0.009
High school or lower	26 (26.0%)	118 (35.0%)	
Junior college	17 (17.0%)	91 (27.0%)	
College	43 (43.0%)	96 (28.5%)	
Graduate school	14 (14.0%)	32 (9.5%)	
Marital status			0.005
Married/ Cohabitation	75 (75.0%)	267 (79.2%)	
Single	20 (20.0%)	32 (9.5%)	
Other	5 (5.0%)	38 (11.3%)	
Monthly individual income [RMB]			0.023
< 2,499	17 (17.0%)	64 (19.0%)	
2,500-4,999	14 (14.0%)	84 (24.9%)	
5,000-9,999	31 (31.0%)	107 (31.8%)	
$\geq 10,000$	38 (38.0%)	82 (24.3%)	
Self-evaluated health status			0.158
Very poor	1 (1.0%)	7 (2.1%)	
Relatively poor	9 (9.0%)	49 (14.5%)	
Average	57 (57.0%)	198 (58.8%)	
Relatively healthy	29 (29.0%)	79 (23.4%)	
Very healthy	4 (4.0%)	4 (1.2%)	
Screening for cervical cancer			0.003
On a regular basis	71 (71.0%)	182 (54.0%)	
Occasionally + Never	29 (29.0%)	155 (46.0%)	
HPV vaccine			0.008
Already/Will	67 (67.0%)	175 (51.9%)	
No/Not sure	33 (33.0%)	162 (48.1%)	

Table 3. Comparison of HPV knowledge, and patient-doctor communication aspects between actively seeking information group and the other group (n = 437)

Variables	Active n = 100	Passive n = 337	p value
Demands of HPV-related knowledge			0.117
No need at all	2 (2.0%)	2 (0.6%)	
Not very much	1 (1.0%)	1 (0.3%)	
Neutral	2 (2.0%)	24 (7.1%)	
In relative demand	41 (41.0%)	113 (33.5%)	
Great demand	54 (54.0%)	197 (58.5%)	
Variables of doctor-patient communication			
Satisfaction	3.5	3	0.253*
Experience	18	18	0.652*
Effectiveness	11	11	0.944*
Expectation	16	16	0.115*
Knowledge question scores	7.27 ± 3.35	6.25 ± 3.32	0.007

*Mann-Whitney U test p value.

cancer screening in women aged 35 to 64 years in rural areas since 2009, uptake of cervical cancer screening has not been evenly distributed and not yet achieved a satisfactory rate (18).

Conclusions and Suggestions

In the current study, we assessed the HPV-related information acquisition and seeking behavior among a group of HPV infected women who first visited the cervical clinic in a tertiary specialty hospital in Shanghai. We found that in general, those women expressed demands for every aspect of HPV-related information; however; only a small proportion of them actively sought information. In general, patients felt obstacles in comprehending the information, indicating less than optimal health information literacy.

To conclude, in this study we did not only evaluate "how the situation is", but also explored "what are the possible barriers and feasible intervention strategies". Public health interventions targeting HPV-infected women can redress misconceptions and may influence their information seeking behavior, increase HPV literacy and knowledge, which could potentially increase HPV vaccine uptake and cervical cancer screening rate. Our findings have provided evidence for developing more precise cervical cancer prevention and control strategies for the target population in Shanghai and also other cities in China.

Acknowledgements

The authors thank all women who participated in this study and filled in a questionnaire.

Funding: This work was supported by a grant from the Shanghai Talent Development Fund to Yan Du

(Grant Number: 2017090). The funding agency had no involvement in study design, data collection, statistical analyses or interpretation of the results.

Conflict of Interest: The authors have no conflicts of interest to disclose.

References

- Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.* 2021; 71:209-249.
- Perkins RB, Wentzensen N, Guido RS, Schiffman M. Cervical cancer screening: A review. *JAMA.* 2023; 330:547-558.
- Yin Y. HPV vaccination in China needs to be more cost-effective. *Lancet.* 2017; 390:1735-1736.
- Freijomil-Vazquez C, Gastaldo D, Coronado C, Movilla-Fernandez MJ. Health care informational challenges for women diagnosed with cervical intraepithelial neoplasia: A qualitative study. *BMC Womens Health.* 2019; 19:112.
- Al Ghamdi NH. Knowledge of human papilloma virus (HPV), HPV-vaccine and pap smear among adult Saudi women. *J Family Med Prim Care.* 2022; 11:2989-2999.
- Rancic NK, Miljkovic PM, Deljanin ZM, Marinkov-Zivkovic EM, Stamenkovic BN, Bojanovic MR, Jovanovic MM, Miljkovic DP, Stankovic SM, Otasevic SA. Knowledge about HPV infection and the HPV vaccine among parents in Southeastern Serbia. *Medicina (Kaunas).* 2022; 58:1697.
- Lin W, Chen B, Hu H, Yuan S, Wu B, Zhong C, Huang W, Liu Z, Wang Y. Joint effects of HPV-related knowledge and socio-demographic factors on HPV testing behaviour among females in Shenzhen. *Eur J Public Health.* 2021; 31:582-588.
- Xu XL, Zhou LL, Antwi HA, Chen X. Evaluation of health resource utilization efficiency in community health centers of Jiangsu Province, China. *Hum Resour Health.* 2018; 16:13.
- Lertkachonsuk AA, Yip CH, Khuhaprema T, Chen DS, Plummer M, Jee SH, Toi M, Wilailak S; Asian Oncology Summit 2013. Cancer prevention in Asia: Resource-stratified guidelines from the Asian Oncology Summit 2013. *Lancet Oncol.* 2013; 14:e497-e507.
- Sbaffi L, Rowley J. Trust and credibility in web-based health information: A review and agenda for future research. *J Med Internet Res.* 2017; 19:e218.
- Younger DS. Health care in China. *Neurol Clin.* 2016; 34:1115-1125.
- Kim K, Shin S, Kim S, Lee E. The relation between eHealth literacy and health-related behaviors: Systematic review and meta-analysis. *J Med Internet Res.* 2023; 25:e40778.
- Okuhara T, Okada H, Goto E, Kiuchi T. Readability assessment of HPV vaccination and cervical cancer information: A systematic scoping review. *Healthcare (Basel).* 2021; 9:1246.
- Becerra MB, Avina RM, Mshigeni S, Becerra BJ. Low human papillomavirus literacy among Asian-American women in California: An analysis of the California health interview survey. *J Racial Ethn Health Disparities.* 2020; 7:678-686.

15. Torres E, Richman A, Wright W, Wu Q. Assessing dental students' HPV health literacy and intention to engage in HPV-related oropharyngeal cancer prevention. *J Cancer Educ.* 2022; 37:950-956.
 16. Wei M, Zhou W, Bi YY, Wang H, Liu Y, Zhang ZJ. Rising mortality rate of cervical cancer in younger women in urban China. *J Gen Intern Med.* 2019; 34:281-284.
 17. You DY, Han LY, Li L, Hu JC, Zimet GD, Alias H, Danaee M, Cai L, Zeng FF, Wong LP. Human papillomavirus (HPV) vaccine uptake and the willingness to receive the HPV vaccination among female college students in China: A multicenter study. *Vaccines (Basel).* 2020; 8:31.
 18. Xia C, Basu P, Kramer BS, Li H, Qu C, Yu XQ, Canfell K, Qiao Y, Armstrong BK, Chen W. Cancer screening in China: A steep road from evidence to implementation. *Lancet Public Health.* 2023; 8:e996-e1005.
- Received September 15, 2023; Revised January 30, 2024; Accepted February 6, 2024.
- Released online in J-STAGE as advance publication February 21, 2024.
- *Address correspondence to:*
Yan Du, Obstetrics and Gynecology Hospital, Fudan University, No. 128 Shenyang Road, Shanghai 200090, China.
E-mail: sophiedu_61@163.com
- Ling Wang, Laboratory for Reproductive Immunology, Obstetrics and Gynecology Hospital of Fudan University, 419 Fangxie Road, Shanghai 200011, China.
E-mail: Dr.wangling@fudan.edu.cn