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Assessment of Knowledge and Attitude Towards Human Papillomavirus Vaccine among Healthcare Professionals at Tertiary Care Hospitals Karachi

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ABSTRACT

Human Papilloma virus (HPV) is a sexually transmitted infection that is leading cause of cancer among women, with 604,000 new cases and 342,000 deaths reported globally in 2020. **Objectives:** To assess the knowledge and attitude of healthcare professionals (HCPs) regarding the HPV vaccine at tertiary care hospitals Karachi. **Methods:** A cross-sectional survey was conducted into two tertiary care hospitals: 1) Dow University Hospital, Karachi, and Dr. Ruth K. M. Pfau Civil Hospital Karachi from May 2025 to July 2025. A purposive sampling technique was used to enroll a total of 384 participants in the study. All healthcare workers were included in the study (doctors, nurses, pharmacists, and technicians). The data were interpreted into SPSS version 26.0. For descriptive analysis: frequency, means, standard deviations, and percentages were calculated. A chi square test was used to assess the association of demographic information of HCPs with knowledge and attitude categories. **Results:** Out of 384, 57.5% of the participants provided correct answers and 42.2% of HCPs had moderate knowledge. About 1/3 of HCPs attitude (32.3%) agreed/strongly agreed towards HPV vaccine and nearly half (46.4%) of HCPs established a neutral attitude. There was a statistically significant association of profession with knowledge ($\chi^2 = 26.70$, df = 6, $p < 0.001$) and attitude categories ($\chi^2 = 22.90$, df = 6, $p < 0.001$) among HCPs. Moreover, doctors representing higher knowledge and positive attitude as compared to nurses and other HCPs. **Conclusions:** This study highlights that healthcare professionals possess a moderate level of knowledge and neutral attitude regarding the HPV vaccine. Doctors demonstrated comparatively higher knowledge and a more favorable attitude than nurses, pharmacists, and technicians

INTRODUCTION

Cervical cancer is the fourth most prevalent form of cancer in women worldwide. It is caused by Human papilloma virus (HPV) infection and approximately 604,000 new cases and 342,000 deaths reported globally in 2020 [1]. Approximately 70% of cervical cancer cases in the world are related to persistent infection with high-risk HPV and mostly type 16 and type 18 [2]. The prevention of HPV is also a top priority in protecting public health since it also causes other anogenital cancers and oropharyngeal cancer [2, 3]. HPV vaccination is highly encouraged in national immunization efforts as one of the major steps to cervical cancer prevention [4]. The HPV vaccine should be applied to both girls and boys [5]. Universal, gender-neutral HPV vaccination would go a long way in increasing herd immunity and further eradicating cervical cancer in the world. Moreover, it provides men with protection against the cancers linked to HPV, defines gender equality in healthcare, and assists in preventing stigma and

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misinformation related to the infection [6]. Studies have shown that cervical cancer and its related infections can be almost entirely prevented through timely screening and HPV vaccination [7]. The developed nations have managed to reduce the cases of HPV infection because of the extensive accessibility of HPV immunization schemes [8]. On the contrary, most low- and middle-income nations (LMICs) are still struggling with the great difficulties of inadequate financial sources, cultural obstacles, and low awareness levels, impeding successful prevention of HPV causing infections and control activities [9]. Countries in South Asia, such as Pakistan, still have a problem with the implementation of HPV vaccine. Although a significant burden of cervical cancer exists, screening for cervical cancer is dismal at only 2% [10]. The model study based on the prediction showed that 90% annual coverage by HPV immunization of girls older than 9 years may potentially prevent approximately 111,000-133,000 incidents of cervical cancer [1]. The HPV vaccine was launched in Pakistan in 2019 under the Expanded Program on Immunization (EPI) for girls between 9 years and 14 years of age, but has not yet been integrated into regular national immunization services [4]. The HCPs play a critical role in vaccination initiatives because their attitudes and knowledge are directly related to the percentage of vaccination within the general population [11]. In a cross-sectional study, awareness about availability of HPV vaccination was very low (20%), and only one in five tertiary care women in Karachi had received the vaccine [12]. For successful execution of HPV vaccination at a national level in Pakistan, there is crucial need to assess the healthcare professional's awareness about HPV vaccination.

Cervical cancer, largely caused by Human Papillomavirus (HPV), remains a significant public health issue in Pakistan, with low national screening rates and limited HPV vaccine coverage. Despite healthcare professionals (HCPs) being critical in promoting vaccination, evidence suggests that their knowledge and attitudes towards the HPV vaccine are moderate to neutral, and gaps exist particularly regarding vaccine schedules and recommendations. While previous studies have assessed HPV awareness, there is limited research in Pakistan focusing specifically on tertiary care HCPs' knowledge and attitudes, highlighting a need to evaluate these factors systematically. Therefore, this study aimed to assess the knowledge and attitude of healthcare professionals towards the HPV vaccine in tertiary care hospitals in Karachi to identify gaps and inform targeted educational interventions.

METHODS

A Cross-sectional survey was conducted into two tertiary care hospitals; Dow University Hospital, Karachi, and the Dr. Ruth K. M. Pfau Civil Hospital Karachi from May 2025 to July 2025. Study includes all healthcare providers (HCPs) like doctors, nurses, pharmacists, technicians. Exclusion criterion: Those healthcare providers who were absent at the time of data collection. A self-administered questionnaire was used to collect the data after approval from IRB (Ref: IRB-3455/DUHS/Approval/2024/162), Dow University of Health Sciences, Karachi, and all the participants provided written consent. Participants were enrolled in the study through a purposive sampling technique. For sample size calculation, an Open-Epi software was used by following formula and criteria: "Sample size n = [DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)] , Population size(for finite population correction factor or FPC)(N): 1000000, Hypothesized % frequency of outcome factor in the population (p):50%+/-5, Confidence limits as % of 100(absolute +/- %)(d):5%, design effect (for cluster surveys-DEFF):1" . The calculated sample size was 384. The study's sample size was divided on a 50% division rule. For example, 192 participants will be from each study setting. Data was collected through a structured questionnaire adapted from previous study (13), it has three parts: Part I consisted of demographic information of the HCPs: age, gender, profession, year of experience, working unit/department. Part II included knowledge of HPV among HCPs, it contains 07 items. 1)HPV vaccine is effective in preventing cervical cancer 2) HPV vaccine is contraindicated in pregnancy.3) HPV is a common sexually transmitted infection.4) Three-dose series is for 15–45 years & immunocompromised individuals.5) Two-dose series recommended for ages 9–14 years.6) HPV vaccine is only effective for a short period. 7) HPV vaccine is recommended for both males and females. Participants have two options to response: correct and incorrect. Each correct response =1 and incorrect response =0. It ranges from 0 to 7. The score of knowledge has divided into three categories good, moderate and poor knowledge score that is based on scoring system of correct and incorrect responses. Score categorize poor (0-2), moderate (3-4) and good knowledge (5-7). Part III included attitude towards HPV among HCP, it has 5 items 1) I believe HPV vaccine is important for preventing cervical cancer.2) I would recommend HPV vaccine to my patients.3) I believe HPV vaccine is safe.4) I believe HPV vaccine is effective.5) I would get HPV vaccine myself / for my child if I were a parent. It was consisted of five-point Likert scale like Strongly Agree =5, Agree =4, Neutral= 3, Disagree=2, Strongly Disagree=1.The score of attitudes was categorized on three scales like if the participants marked score between 18 – 25= to positive attitude, 12-17= neutral

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attitude and 5-11= negative attitude. The data was analyzed and entered on SPSS 26. For descriptive analysis frequency, means, standard deviations, and percentages were calculated. The knowledge and attitude categories were calculated by summing up the scoring system of correct and incorrect responses, Likert scale and total ranges that is assigned in each category of knowledge and attitude scores. A chi square test was used to assess the association of demographic information of HCPs with knowledge and attitude categories. A bar chart and pie chart was used for visual demonstration of HPV knowledge and attitude categories among HCP.

RESULTS

A total of 384 participants took part in the study, with a mean age of 40.1 ± 10.5. The majority were female (n=284, 73.9%), most were nurses (n=222, 57.8%), and a significant portion had 6 to 10 years of work experience (n=140, 36.5%). Additionally, a large number were working in the gynecology ward (n=120, 16.1%) (Table 1).

Table 1: Demographic Information of HCPs (n=384)

Variables	n (%)
Age	
Mean ± SD	40.1 ± 10.5
Gender	
Male	100 (26.0%)
Female	284 (74.0%)
Profession	
Doctor	140 (36.5%)
Nurse	222 (57.8%)
Pharmacist	12 (3.1%)
Other	10 (2.6%)
Years of Experience	
1–5 Years	136 (35.4%)
6–10 Years	140 (36.5%)
More than 10 Years	108 (28.1%)
Department	
Gynae	120 (31.3%)
Pediatrics	80 (20.8%)
Medicine	90 (23.4%)
Surgery	64 (16.7%)
Oncology	10 (2.6%)
Other	20 (5.2%)

Overall mean number of correct responses per item was (Mean ± SD =220.7± 63.7). Out of 384, 57.5% of the HCPs gave correct answers. The highest knowledge was reported regarding the preventive role of the HPV vaccine against cervical cancer (68.0%), its contraindication in pregnancy (70.3%), and recognition of HPV as a common sexually transmitted infection (66.9%). Similarly, misconceptions about short-term effectiveness were marked by most participants, with 67.7% answering correctly, and over 62% acknowledged that the vaccine is recommended for both male and female (Table 2).

Table 2: Knowledge of HPV Vaccine among HCPs (n=384)

Knowledge Statement	Correct (True), n (%)	Incorrect/Don't Know, n (%)
The HPV Vaccine is Effective in Preventing Cervical Cancer	261 (68.0%)	123 (32.0%)
The HPV Vaccine is Contraindicated in Pregnancy	270 (70.3%)	114 (29.7%)
HPV is a Common Sexually Transmitted Infection	257 (66.9%)	127 (33.1%)
Three-Dose Series is for 15–45 Years and Immunocompromised Individuals	132 (34.4%)	252 (65.6%)
Two-Dose Series Recommended for Ages 9–14 Years	125 (32.6%)	259 (67.4%)
The HPV Vaccine is only Effective for a Short Period. (False)	260 (67.7%)	124 (32.3%)
The HPV Vaccine is Recommended for both Male and Female	240 (62.5%)	144 (37.5%)
Per Items	220.7 ± 63.7	163.3 ± 63.7
Total	1545 (57.5%)	1143 (42.5%)

The distribution of knowledge scores is presented. The majority of HCPs (n = 162, 42.2%) were categorized as having a moderate level of knowledge. Good knowledge was observed in 118 participants (30.7%), while 104 (27.1%) demonstrated poor knowledge (Figure 1).

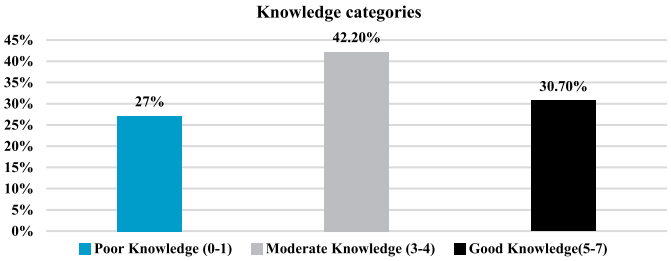

Figure 1: Knowledge Categories among HCPs (n=384)

About one-third of HCPs' attitudes (32.3%) agreed/strongly agreed with the HPV vaccine. Most of the (78.7%) HCPs acknowledged the importance of the vaccine in preventing cervical cancer, (74.2%) were hesitant about recommending it, (71.4%) considered it safe, and (70.0%) accepted it for themselves or their children (Table 3).

Table 3: Attitudes Regarding HPV Vaccine among HCPs (n=384)

Statements	Agree/ Strongly Agree (4–5)	Neutral (3)	Disagree/ Strongly Disagree (1–2)
I Believe the HPV Vaccine is Important for Preventing Cervical Cancer	210 (78.7%)	52 (13.5%)	30 (7.8%)
I Would Recommend the HPV Vaccine to my Patients	61 (15.9%)	150 (74.2%)	38 (9.9%)
I Believe the HPV Vaccine is Safe	44 (11.5%)	66 (17.2%)	130 (71.4%)
I Believe the HPV Vaccine is Effective	60 (15.6%)	230 (72.7%)	45 (11.7%)
I Would Get the HPV Vaccine Myself/ For my Child if i were a Parent	64 (16.7%)	130 (70.0%)	51 (13.3%)

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Total (Overall %)	439 (32.3%)	628 (46.1%)	294 (21.6%)

The overall attitudes of HCPs towards the HPV vaccine are shown. A neutral attitude was the most common (n=178, 46.4%), followed by a positive attitude (n=122, 31.8%), and a negative attitude (n=84, 21.8%) (Figure 2).

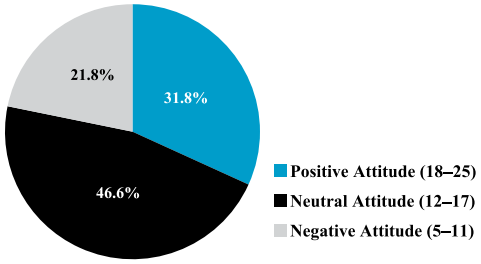

Figure 2: Attitude Categories Toward HPV Vaccine among HCPs (n=384)

There was a statistically significant association between profession and knowledge categories (χ^2 = 26.70, df = 6, p<0.001) among HCPs. Doctors demonstrated higher knowledge (50%) compared to nurses (45%), pharmacists (33%), and other HCPs (20%). Other demographic factors, such as gender, years of experience, and department, did not show significant associations with knowledge categories among HCPs (p>0.05) (Table 4).

Table 4: Association of Demographic Information with HPV Knowledge Categories among HCPs (n=384)

Variables	Categories	Poor, n (%)	Moderate, n (%)	Good, n (%)	χ^2 (df)	p-value
Gender	Male (n=100)	30 (30.0%)	40 (40.0%)	30 (30.0%)	2.45 (2)	0.294
	Female (n=284)	70 (24.6%)	120 (42.3)	94 (33.1%)		
Profession	Doctors (n=140)	20 (14.3%)	50 (35.7%)	70 (50.0%)	26.70 (6)	<0.001*
	Nurses (n=222)	52 (23.5%)	70 (31.5%)	100 (45.0%)		
	Pharmacist (n=12)	6 (50.0%)	2 (16.7%)	4 (33.3%)		
	Other (n=10)	4 (40.0%)	4 (40.0%)	2 (20.0%)		
Working Experience (Years)	1–5 (n=136)	40 (29.4%)	60 (44.1%)	36 (26.5%)	3.98 (4)	0.409
	6–10 (n=140)	35 (25.0%)	60 (42.9%)	45 (32.1%)		
	>10 (n=108)	25 (23.1%)	50 (46.3%)	33 (30.6%)		
Department	Gynae (n=120)	28 (23.3%)	50 (41.7%)	42 (35.0%)	15.85 (10)	0.105
	Pediatrics (n=80)	25 (31.3%)	30 (37.5%)	25 (31.3%)		
	Medicine (n=90)	20 (22.2%)	40 (44.4%)	30 (33.3%)		
	Surgery (n=64)	15 (23.4%)	30 (46.9%)	19 (29.7%)		
	Oncology (n=10)	3 (30.0%)	4 (40.0%)	3 (30.0%)		
	Other (n=20)	5 (25.0%)	10 (50.0%)	5 (25.0%)		

There was a statistically significant association between profession and attitude (χ^2 = 22.90, df = 6, p<0.001) among HCPs. Doctors showed a more positive attitude (60.7%) toward HPV vaccination compared to nurses (37.0%), pharmacists (16.7%), and other HCPs (30.0%). Other demographic factors, such as gender, years of experience, and department, did not show significant associations with attitude categories (p>0.05) (Table 5).

Table 5: Association of Demographic Variables with Attitude Categories of HPV Vaccine among HCPs (n=384)

Variables	Categories	Negative, n (%)	Neutral, n (%)	Positive, n (%)	χ^2 (df)	p-value
Gender	Male (n=100)	25 (25.0%)	35 (35.0%)	40 (40.0%)	1.85 (2)	0.397
	Female (n=284)	50 (17.6%)	100 (35.2%)	134 (47.2%)		
Profession	Doctors (n=140)	15 (10.7%)	40 (28.6%)	85 (60.7%)	22.90 (6)	<0.001*
	Nurses (n=222)	50 (22.5%)	90 (40.5%)	82 (37.0%)		
	Pharmacist (n=12)	6 (50.0%)	4 (33.3%)	2 (16.7%)		
	Other (n=10)	4 (40.0%)	3 (30.0%)	3 (30.0%)		
Working Experience (Years)	1–5 (n=136)	30 (22.1%)	50 (36.8%)	56 (41.2%)	4.42 (4)	0.351
	6–10 (n=140)	30 (21.4%)	55 (39.3%)	55 (39.3%)		
	>10 (n=108)	15 (13.9%)	30 (27.8%)	63 (58.3%)		
Department	Gynae (n=120)	20 (16.7%)	40 (33.3%)	60 (50.0%)	14.20 (10)	0.165
	Pediatrics (n=80)	20 (25.0%)	30 (37.5%)	30 (37.5%)		
	Medicine (n=90)	15 (16.7%)	35 (38.9%)	40 (44.4%)		
	Surgery (n=64)	12 (18.8%)	25 (39.1%)	27 (42.2%)		
	Oncology (n=10)	2 (20.0%)	3 (30.0%)	5 (50.0%)		
	Other (n=20)	6 (30.0%)	7 (35.0%)	7 (35.0%)		

DISCUSSION

The current study revealed that 42.2% of HCPs had moderate knowledge, 30.7% showed good knowledge, and 27.1% demonstrated poor knowledge. The highest knowledge was reported regarding the preventive role of the HPV vaccine against cervical cancer (68.0%), its contraindication in pregnancy (70.3%), and recognition of HPV as a common sexually transmitted infection (66.9%). Misconceptions about short-term effectiveness were marked by most participants, with 67.7% answering correctly, and over 62% acknowledged that the vaccine is recommended for both males and females. Similar findings were in line with previous studies that showed study participants had greater knowledge about HPV and its vaccine potency, but they did not know the vaccination schedule, except for a few unvaccinated participants who knew about vaccine safety [16, 17]. In contrast, a study from Iran highlighted that more than 90% of the HCPs knew about HPV and its vaccine, and 76% were aware that the HPV vaccine can prevent cervical cancer. And most frequently answered by 95.7% that HPV is a sexually transmitted disease [18]. A study from Kazakhstan reported that 61.1% participants had marked correct answers about HPV and its vaccine, which was associated with a higher level of education and income status [19]. A

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Saudi Arabian study revealed that general healthcare provider awareness was at an average level, indicating that there were still gaps in various healthcare cadres [20]. One of the studies in Qatar found that 83.7% of the respondents were sufficiently informed about the HPV infection, and that only 69.1% of the study population were aware of the existence of HPV vaccination in their native country. Most of the respondents (89.4) made some observations (insight) that HPV may be asymptomatic, and 46.5% noted that the least interest was in physicians to promote the HPV vaccination [21]. Iranian research also revealed that 63.4% of the medical practitioners were well aware of HPV and its vaccine, and 71.6% offered their patients the vaccine [17]. A systematic review revealed that, in most cases, the providers of health care had sufficient knowledge of the HPV infection and its impact on health. The respondents indicated that there was a perceptible gap in their knowledge when it came to the specifics of HPV vaccines and their benefits. It was highlighted on the occasion of an educational session on the concept of HPV vaccination to push its suggestions [22]. In the current research, it was established that almost half of all participants (46.4%) showed a neutral position, and only 31.8% provided a positive attitude, and 21.8% gave a negative attitude. The majority of the (78.7%) HCPs realized the relevance of the vaccine in the prevention of cervical cancer, (74.2%) were reluctant to recommend the vaccine, (71.4%) thought it was safe, and (70.0%) accepted it personally or on behalf of their children. The majority (78.7%) of the respondents noted that the vaccine is critical in the prevention of cervical cancer. Nevertheless, neutral answers were often provided when asked about such main issues as the recommendation of the vaccine to the patients, the belief in its efficacy, and the readiness to be vaccinated or have the children vaccinated. This shows that it is not only knowledge that leads to strong positive attitudes or proactive behaviors. In the Chinese study, the largest proportion of respondents had a positive attitude towards HPV vaccination by health care professionals. Approximately 95 percent of the healthcare providers had advised their patients to receive HPV vaccination; some of them were not prepared because of its unknown side effects [14]. An overview of 65 studies found that there was a general belief that healthcare providers recommended HPV vaccination, but that they encountered barriers to their recommendations, including parental concerns regarding vaccine safety, efficacy of the vaccine, and affordability [22]. This has also been noted in other research, with the physicians being more confident about the vaccine compared to other healthcare workers. However, even the intent to prescribe or personally accept vaccination was low among doctors, indicating the presence of barriers to it, including cost, cultural, and patient misconceptions [7, 8]. A Kazakh research study found that 72.6% of HCPs were positive in recommending the HPV vaccine. The rate of recommendation of the HPV vaccine was greater among people who had heard about HPV and its vaccine, as well as those with a positive attitude toward the COVID-19 vaccine. Besides, HCPs highlighted significant obstacles to introducing HPV vaccination to the population, similarly, concerns about the safety, its efficacy, its negative impact on health, and the ignorance of HCPs [18]. The researcher established a statistically significant relation between profession and knowledge (χ^2 = 26.70, df = 6, p=0.001) and categories of attitudes among HCPs (χ^2 = 22.90, df = 6, p=0.001). The physicians exhibit better understanding and a positive mindset than the nurses and other healthcare providers. Past results showed these differences between physicians and nurses. A study in Pakistan reported that 96.5% of doctors had good knowledge compared to 77.4% of nurses and 81.6% of other healthcare staff [15]. Likewise, a Greek study discovered that 80.3% of doctors had good knowledge of HPV, but most of them had not been vaccinated themselves. Approximately 60 percent of the physicians and 35% of nurses were aware of HPV and its vaccine [23]. The survey of 1,189 healthcare workers in Kazakhstan showed that the level of knowledge among physicians was better than among nurses (66.5% vs. 44.1%), and 72.6% were willing to recommend vaccination [18]. The other observation was that physicians were found to be well informed (67.2%) and positive (90.9%) about attitudes, but only to prescribe the vaccine (37.5%). Cost, absence of time, and low patient awareness were the primary obstacles [7]. Only 42% of the gynecologists and 57% of the family physicians possessed the appropriate knowledge in Poland [24]. In the same way, a Turkish study indicated that physicians scored higher on the knowledge test than nurses, though there was still a gap in both scores [25].

This study was limited by its cross-sectional design, use of purposive sampling, and reliance on self-reported data, which may restrict causal inference and generalizability beyond tertiary care settings. Additionally, attitudes and practices may be influenced by social desirability bias. Future studies should employ longitudinal or mixed method designs with probability sampling across diverse healthcare settings to better explore determinants of knowledge and attitudes. Targeted educational interventions should also be evaluated to assess their effectiveness in improving healthcare professionals' advocacy for HPV vaccination.

CONCLUSIONS

This study revealed that healthcare professionals possess a moderate level of knowledge and neutral attitude towards HPV vaccine. Doctors showed comparatively higher

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awareness and a more positive outlook than nurses, pharmacists, and technicians. To address these gaps, it is recommended to conduct regular training sessions and workshops, integrate HPV and cervical cancer prevention into medical, nursing, and allied health curricula, and promote hospital-based awareness campaigns. National policies should also ensure vaccine accessibility and affordability. Further research is needed to identify barriers influencing healthcare professionals' attitudes and to assess the effectiveness of educational interventions in enhancing their knowledge and advocacy for HPV vaccination.

Authors' Contribution

Conceptualization: MAR
Methodology: MAR, JAH, MS, RMH
Formal analysis: RQ, TA
Writing and Drafting: MAR, JAH, RQ, MS, RMH, TA
Review and Editing: MAR, JAH, RQ, MS, RMH, TA

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

The authors declare no conflict of interest.

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