

Original article

Knowledge, Attitude and Practice of Primary Care Physicians Toward Adult Vaccination in Abha City

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Abstract

Aim of study: To assess knowledge, attitude and practice of primary care physicians offering primary health care (PHC), toward adult vaccination and their own vaccination coverage as well as to identify reasons for low vaccination coverage. **Methodology:** A cross-sectional study design, this study included 103 PHC physicians in Abha City. A self-administered questionnaire was designed by the researcher for data collection. **Results:** About three fourths of PHC physicians (73%) had poor knowledge, while 21% had moderate knowledge and only 6% had good knowledge, while 41% had positive attitude toward adult vaccination, 49% had neutral attitude while 10% had negative attitude. Most PHC physicians (70%) had poor practice regarding adult vaccination, while 20% had moderate practice and 10% had good practice. PHC physicians' knowledge was significantly better among older and non-Saudi physicians ($p < 0.001$ and $p = 0.001$, respectively). PHC physicians' positive attitude toward adult vaccination was significantly higher among female participants ($p = 0.013$), among Non-Saudi physicians ($p = 0.004$) and among those with experience in primary health care more than 10 years ($p = 0.044$). PHC physicians' good practice regarding adult vaccination was significantly higher among older physicians and among those with experience in primary health care more than 10 years ($p = 0.004$). The most frequently stated reasons for low adult vaccination coverage were "Lack of coordinated immunization programs for adults" (63.1%), "Physicians do not inform patients about adult vaccination because they do not have enough time" (61.2%) and "Lack of availability of up-to-date records and recording systems" (55.3%). **Conclusions:** Knowledge of PHC physicians in Abha City regarding adult vaccination is suboptimal. Most of them do not have negative attitude toward adult vaccination. Their practice regarding adult vaccination is mostly poor. There are several obstacles against implementing vaccination of adults.

Keywords: Physicians; Vaccinations; Knowledge; Attitude; Practice

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Introduction

Adult vaccination has gained as much attention as childhood vaccination nationwide and worldwide in recent years. Several studies have been performed with a variety of suggestions regarding adult

vaccination¹⁻⁴. But still, vaccination is not seen as a part of adult health care services, and adult vaccination programs are not as effective and as approachable as they are in childhood^{4,5}. Lack of knowledge in physicians and in society, preoccupations concerning

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the efficacy and side effects of vaccines, not being under the coverage of health insurance, the lack of a national health policy regarding adult vaccination and the economic cost that it brings to the government can all be considered as reasons for insufficient adult vaccination.⁶⁻⁸

An estimated 50,000-90,000 Americans die of vaccine preventable diseases each year, the vast majority of these being adults. With the recent emergence of viral strains and bacterial organisms that have had more serious consequences in healthy young adults, routine vaccination of this population is a growing necessity. Furthermore, the healthcare cost of vaccine preventable diseases (VPDs) is substantial. For example, the yearly national economic burden of influenza disease is estimated to be \$10.4 billion in direct medical costs and a total economic burden of over \$87 billion⁹. Because of the nature of transmissible diseases, immunization is important not only for an individual's health, but also for the health of the community at large¹⁰.

In Saudi Arabia, until very recently vaccination has been considered as a special procedure for children, and apart from some exceptional cases and individual applications, adult vaccination has been neglected. Planning, coordination and continuity in administration are all very important issues in obtaining success¹¹. Increasing the awareness of physicians, in other words, dealing with the lack of knowledge, which is accepted as one of the reasons for insufficient adult vaccination, and implementing them to give the necessary importance, will provide success in adult vaccination¹². Physicians should evaluate the adults they see in hospitals or polyclinics, whether healthy or ill, regarding immunization against preventable diseases. They should not miss the opportunity of completing missing vaccines; they should inform the patients about the diseases and the importance of vaccination¹¹.

In recent years, new vaccines such as herpes zoster and human papillomavirus have become available for adults. Despite these advances, the vaccination rates of adults in Saudi Arabia are low, resulting in many adults remaining vulnerable to vaccine preventable diseases¹⁰.

Common reasons for incomplete immunization in adulthood include:¹² Lack of recognition of the importance of adult immunization; lack of recommendation from health care providers; lack of health care provider knowledge about adult immunization and recommended vaccines; misrepresentation/misunderstanding of the risks of

vaccine and benefits of disease prevention in adults; lack of understanding of vaccine safety and efficacy; missed opportunities for vaccination in health care providers' offices, hospitals and nursing homes; lack of publicly-funded vaccine and reimbursement to vaccine providers; lack of coordinated immunization programs for adults; lack of regulatory or legal requirements; fear of injections; lack of availability of up-to-date records and recording systems.

Methodology

Setting: This study was conducted in Abha City, Asser Province, Saudi Arabia, on the slopes of Al-Sarawat Mountains. In Abha City, there are 47 primary health care centers, in which 138 physicians are working. The study was conducted at the Ministry of Health PHC centers in Abha City.

Study design: A cross sectional study

Study population: PHC physicians (N=138) working in the primary health care centers belonging to the MOH in Abha city in 2015.

Sample size and sampling technique: Owing to the relatively small number of PHC physicians, all of them were invited to participate in the study.

Data collection tool: The researcher used a self-administered questionnaire that was previously used in a similar Turkish study and proved to be valid and reliable.^[12] Apart from the questions revealing the descriptive characteristics, their vaccination coverage, their relatives vaccination coverage, which adult vaccines they knew, and their attitude towards suggesting them to their patients were all inquired. To establish which vaccines they would suggest, they were asked to write the vaccines in some given situations. The 2009 report from the Center of Disease Control and Prevention (CDC) was taken into account in the preparation of the questions regarding risk factors and the age at which the vaccinations should be applied⁴.

Data collection technique: The researcher distributed the self-administered questionnaire during the working hours; care was taken to not disturb the physicians. The researcher rendered himself available to clarify any issue and the questionnaires were collected on the same day. This duration of data collection was one month.

Data entry and analysis: Collected data were verified by hand then were coded and entered into a personal computer. Statistical analysis was conducted using the Statistical Package of Social Sciences (SPSS version 20.0 for Windows, SPSS Inc., Chicago, IL, USA). Data were shown as frequency and percentage. For the comparison of categorical data, Chi-square

test (for small frequencies) was applied. P values less than 0.05 were considered as statistically significant.

Pilot study: A pilot study was conducted on 10 family medicine residents in Aseer Program over one week. It helped in the adaptation of the study questionnaire. The results were not included in the main report.

Ethical considerations: Before starting data collection, the researcher obtained an approval letter from Aseer Directorate of Health for Primary Health Care. The study questionnaire was anonymous. Participants were assured that results of this study would not be used for performance appraisal of the individuals. To maintain the confidentiality from the health authority, participant physicians were asked to send the completed questionnaires directly to the researcher.

Budget: This study was self-funded.

Results

Table (1) shows that 30(34%) of participants were less than 30 years old, 40 (44.7%) were 30-40 years old and 20(21.4%) were older than 40 years. About two thirds of participants 67(65%) were males, 60(63.1%) were Saudi. About two thirds of participants 67(65%) were MBBS qualified, 20(19.4%) had Diploma or Master degrees and 16(15.5%) had PhD or equivalent. Almost half of participants 49(47.6%) were general practitioners, 34(33%) were residents, 18(17.5%) were registrars/senior registrars, while 2(1.9%) were consultants. Participants experience in PHC practice was less than 5 years among 48(46.6%), 5-10 years among 35(34%) and more than 10 years among 20(19.4%). Table (2) shows that regarding elderly patients (aged >65 years), participants' most correct responses were related to influenza vaccine 97(94.2%), followed by pneumococcus 83(80.6%), meningococcus 40(38.8%), tetanus (35.9%), and hepatitis B 34(33%). Their correct responses were least regarding Hib 26(25.2%) and hepatitis A 22(21.4%). Regarding living with or providing care for a child <5 years, the most correct responses were related to influenza vaccine 81(78.6%), followed by pneumococcus 52(50.5%), meningococcus and hepatitis B 48(46.6% for both), and Hib 46(44.7%). Their correct responses were least regarding hepatitis A 44(42.7%) and tetanus 32(31.1%). Regarding pregnancy, the most correct responses were related to influenza vaccine 84(78.6%), followed by pneumococcus 23(22.3%), meningococcus 16(15.5%), hepatitis B 26(25.2%), and Hib 22(21.4%). Their correct responses were least regarding hepatitis A (42.7%) and tetanus (31.1%).

Regarding pilgrim, the most correct responses were related to influenza vaccine 73(70.9%), followed by meningococcus 57(55.3%), pneumococcus 34(33%), hepatitis A 26(25.2%), and Hib 20(19.4%). Their correct responses were least regarding tetanus 14(13.6%) and hepatitis B 8(7.8%). Regarding health personnel, the most correct responses were related to influenza vaccine 91(88.3%), followed by hepatitis B 89(86.4%), pneumococcus 55(53.4%), meningococcus 54(52.4%), and tetanus 52(50.5%). Their correct responses were least regarding hepatitis A 40(38.8%) and Hib 30(29.1%).

Table (3) shows that regarding vaccines administered to adult patients with immune deficiency, participants most correct responses were related to influenza vaccine 93(90.3%), followed by pneumococcus 73(70.9%), hepatitis B 46(44.7%) and meningococcus 45(43.7%). Their correct responses were least regarding tetanus 27(26.2%) and hepatitis A 12(11.7%). Regarding their knowledge about vaccines administered to adult diabetic patients, the most correct responses were related to influenza vaccine 101(98.1%), followed by pneumococcus 81(78.6%), hepatitis B 44(42.7%) and meningococcus 42(40.8%). Their correct responses were least regarding tetanus 38(36.9%) and hepatitis A 30(29.1%). Regarding their knowledge about vaccines administered to adult patients with chronic liver disease, the most correct responses were related to influenza vaccine 73(70.9%), followed by pneumococcus 53(51.5%), hepatitis A 45(43.7%) and hepatitis B 42(40.8%). Their correct responses were least regarding meningococcus 41(39.8%) and tetanus 32(31.1%). Regarding their knowledge about vaccines administered to adult kidney dialysis patients, the most correct responses were related to influenza vaccine 79(76.7%), followed by pneumococcus 61(59.2%), hepatitis B 56(54.4%) and hepatitis A 39(37.9%). Their correct responses were least regarding meningococcus 32(31.1%) and tetanus 30(29.1%).

Regarding adult vaccination, about three fourths of primary health care physicians 75(73%) had poor knowledge, while 22(21%) had moderate knowledge and only 6(6%) had good knowledge.

Table (4) shows that the most primary health care physicians 93(90.3%) agree that adult vaccination a protective modality, that pregnant women should be asked about their vaccination coverage 87(84.5%), that there is a need to ask patients at risk about their vaccination coverage 76(73.8%) and that it is important to ask elderly

patients about their vaccination coverage 64(62.1%). However, about one fourth of participants think that there is no need to establish antibody levels before hepatitis B vaccination 28(27.2%) and another one fourth of them think that their knowledge about adult vaccination is insufficient.

Forty-seven (41%) of primary health care physicians had positive attitude toward adult vaccination, 51(49%) had neutral attitude while 51(10%) had negative attitude.

Table (5) shows that about three fourths of primary health care physicians 78(75.7%) received influenza and hepatitis B vaccines, while 42(40.8%) received tetanus vaccine, 22(21.4%) received the pneumococcal vaccine and 14(13.6%) received the HPV vaccine. About half of participants 58(56.3%) vaccinated their first degree relatives against influenza, while other vaccines were less frequently applied, e.g., hepatitis B 42(40.8%) and tetanus 26(25.2%). Most participants 89(86.4%) recommended the influenza vaccines to their patients, while other vaccines were less frequently recommended, e.g., tetanus 74(71.8%) and hepatitis B 63(61.2%).

The study revealed that primary health care physicians 72(70%) had poor practice regarding adult vaccination, while 21(20%) had moderate practice and 10(10%) had good practice.

Table (6) shows that primary health care physicians' knowledge regarding adult vaccination differed significantly according to their age with highest proportion of those with poor knowledge among the youngest age group and the lowest proportion of those with poor knowledge among older age groups ($p<0.001$). Saudi physicians had significantly higher proportion of poor knowledge than non-Saudi physicians (80% vs. 60.5%, respectively, $p=0.001$). However, primary health care physicians' knowledge grades did not differ according to their gender, qualification, position or experience in primary health care practice.

Table (7) shows that primary health care physicians' positive attitude toward adult vaccination was significantly higher among female participants ($p=0.013$), among Non-Saudi physicians ($p=0.004$), among registrars and senior registrars ($p=0.001$) and among those with experience in primary health care more than 10 years ($p=0.044$). However, primary health care physicians' attitude grades did not differ according to their age or qualification.

Table (8) shows that primary health care physicians' good practice regarding adult vaccination was significantly higher among participants older than 40

years ($p<0.001$), among MBBS qualified physicians ($p=0.018$), and among those with experience in primary health care more than 10 years ($p=0.004$). However, primary health care physicians' practice grades did not differ according to their gender, nationality or position.

Table (9) shows that the most frequently stated reasons for low adult vaccination coverage were "Lack of coordinated immunization programs for adults" (63.1%), "Physicians do not inform patients about adult vaccination because they do not have enough time" (61.2%) and "Lack of availability of up-to-date records and recording systems" (55.3%).

Discussion

Globally, adult vaccination has recently gained as much attention as childhood vaccination worldwide.¹¹ However, vaccination of adults has not been seen as a part of adult health care services, and adult vaccination programs are not as effective and as approachable as they are in childhood⁵.

This study aimed to assess the knowledge, attitude and practice of primary health care physicians in Abha City regarding adult vaccination.

Results of this study showed the variability in qualifications and positions among participant primary health care physicians. About two thirds of participants were general practitioners with MBBS Degree, while one third of them had Diploma, Master, PhD or equivalent. Almost half of participants were general practitioners, one third was residents, and the rest were registrars/senior registrars or consultants.

This finding is in agreement with that of that of Bovier et al.⁵ who noted the wide variability in primary care physicians' qualifications and specialties in Geneva, Switzerland, where almost half of physicians were general practitioners and the other half were general internists or other specialties.

Results of the present study revealed that, regarding primary health care physicians' knowledge about adult vaccination, only 6% had good knowledge, 21% had moderate knowledge, while 73% had poor knowledge. Regarding vaccinating adults in high risk groups, participants' most correct responses were related to influenza vaccine followed by pneumococcal vaccines, while the knowledge of most participants about all other vaccines were deficient. Regarding their knowledge about vaccines administered to adults in some disease groups, the highest correct responses were related to influenza and pneumococcal vaccines, while the knowledge of most participants about all other vaccines were

deficient.

In USA, Tan et al.²³ reported that primary care physicians had low knowledge regarding adult vaccination.

Hurley et al.²⁴ explained the variability in primary health care physicians' knowledge regarding different adult vaccines by that, in primary care practice, an environment with lower perceived priority of certain vaccines could have implications for knowledge and vaccine delivery. Several factors contribute to primary health care physicians' perceptions that some vaccines are less important than other preventive services, including evidence supporting the use of the preventive service, access to the service, patient demand for the service, physician experience treating certain diseases, clarity of the guideline recommending the service, and whether or not the service is tracked as a performance measure for the practice. The poor physicians' knowledge regarding some vaccines, e.g., tetanus, compared with better knowledge regarding other vaccines, e.g., influenza and pneumococcal vaccines, may reflect the difficulty some physicians have in providing these vaccines to the adult population.

The Centers for Disease Control and Prevention¹⁵ reported that, the adult vaccination schedule is complex since several vaccine recommendations are risk-based or require knowledge of vaccination history, which is often not available. Most physicians agreed that the age-based and medical condition-based indications for vaccination were difficult to follow.

These findings are in agreement with those of MacDougall et al.,¹⁶ in Canada, who noted that despite guidelines for adult vaccination, there are substantial gaps in knowledge among healthcare providers.

Findings of the present study showed that 41% had positive attitude toward adult vaccination. Most primary health care physicians agreed that adult vaccination a protective modality, that pregnant women should be asked about their vaccination coverage, that there is a need to ask patients at risk about their vaccination coverage and that it is important to ask elderly patients about their vaccination coverage. However, about one fourth of participants think that there is no need to establish antibody levels before hepatitis B vaccination and another one fourth of them think that their knowledge about adult vaccination is insufficient.

These findings are in accordance with those of Baykan et al.,¹¹ in Turkey, who found that 83% of primary

health care physicians believe that vaccinating adults is a modality of protection, 49.6% agreed to question pregnant women about their vaccination coverage, 68.8% agreed that there is a need to ask adult patients at risk about their vaccination coverage, but 18.4% agreed to ask elderly patients (aged 65 years or more) about their vaccination coverage, 12.4% stated that there is no need to establish antibody levels before hepatitis B vaccination and 23.4% of primary health care physicians find their knowledge about adult vaccination as insufficient.

MacDougall et al.¹⁶ found that about half of physicians have positive attitudes toward adult vaccination, where 46.9% of physicians believed that vaccines are more important for children than adults, 54.7% agreed that it is difficult to keep up with vaccination recommendations for adults.

Findings of the present study showed that most primary health care physicians had poor practice regarding adult vaccination, while only 10% had good practice. About three fourths of primary health care physicians received influenza and hepatitis B vaccines, while 40.8% received tetanus vaccine, 21.4% received the pneumococcal vaccine and 13.6% received the HPV vaccine. In addition, about half of participants vaccinated their first degree relatives against influenza, while other vaccines were less frequently applied. Moreover, most participants recommended the influenza vaccines to their patients, while other vaccines were less frequently recommended.

Pickering et al.¹⁷ stated that the risk of health personnel of being exposed to diseases preventable by vaccination and of infecting their patients is substantially high. Health personnel should get a repeat dose of tetanus. All people dealing with blood and blood products should be vaccinated against hepatitis B, and every health personnel should get an influenza vaccination. Apart from these, some other vaccinations are administered in special situations.

Vaccination against influenza was received by most participant primary care physicians in the present study (75.7%). Lower rates have been reported by Baykan et al.,¹¹ in Turkey (58.5%). Moreover, vaccination rates of physicians' first degree relatives were also low.

It is to be noted that influenza vaccination has been suggested to the health personnel by CDC, since 1980's. The mainstay of this suggestion is that sick health personnel pose the risk of infecting patients at work, and in places with non-vaccinated health personnel, hospital-borne influenza epidemics can be

seen¹⁸⁻²⁰.

Szucs et al.²¹ added that vaccination of health personnel decreases patient morbidity and mortality and days out of work, and provides economic contribution to healthcare organizations. Nevertheless, several studies in Australia, Italy and United States of America indicated that the influenza vaccination rates among health personnel were below 50%²²⁻²².

Vaccination against hepatitis B was received by most participant primary care physicians in the present study (75.7%), while 40.8% had their first degree relatives being vaccinated, while 61.2% of participants suggested it to their patients.

Aka and Dündar²⁴ stated that blood-borne infectious diseases pose an occupational hazard for health workers. In a university hospital, they reported that 37% of health personnel that had the risk of contact with patients' blood were vaccinated against hepatitis B.

In Turkey, Demir et al.²⁵ reported that vaccination rate against hepatitis B was 55.8% while Uzun et al.²⁶ reported a vaccination rate of 88.7% among residents of a university hospital, while Baykan et al.¹¹ reported that 67.0% of physicians were vaccinated against hepatitis B. In studies from France and USA the vaccination rates against hepatitis B were around 80% - 90%²⁷⁻²⁸.

In USA, Campos-Outcalt et al.²⁹ noted that 80% of family physicians reported providing most routinely recommended adult vaccines at their practice primary health care sites.

The present study showed that primary health care physicians' knowledge regarding adult vaccination differed significantly according to their age with highest proportion of those with poor knowledge among the youngest age group. Saudi physicians had significantly higher proportion of poor knowledge than non-Saudi physicians. Moreover, physicians' positive attitude toward adult vaccination was significantly higher among female participants, among non-Saudi physicians, among registrars and senior registrars and among those with experience in primary health care more than 10 years. In addition, physicians' good practice regarding adult vaccination was significantly higher among participants older than 40 years, among MBBS qualified physicians, and among those with experience in primary health care more than 10 years.

Perhaps better knowledge regarding adult vaccination among older physicians can be expected. However, a higher proportion of poor knowledge among Saudi physicians may be explained by the fact that in Saudi Arabia, the employment of non-Saudi

physicians follows strict criteria to employ only the best knowledgeable physicians. In addition, non-Saudi physicians have to follow the guidelines very carefully to avoid termination of their contracts. All these points do not perfectly apply to Saudi primary health care physicians. Hence, the significantly poorer knowledge among Saudi physicians.

Hurley et al.¹⁴ stated that primary health care providers had positive attitude toward adult vaccination, which was significantly higher among females and those with more experience in medical practice.

Abramson and Levi⁶ and Baykan et al.¹¹ found that vaccination practices for adults were higher in female physicians compared to male physicians, but with no significant differences.

Results of the present study showed that the most frequently stated reasons for low adult vaccination coverage were "Lack of coordinated immunization programs for adults", "Physicians do not inform patients about adult vaccination because they do not have enough time" and "Lack of availability of up-to-date records and recording systems".

Several studies reported reasons for low rates of adult vaccination. Stated reasons comprised lack of knowledge among primary care physicians, preoccupations concerning the efficacy and side effects of vaccines, not being under the coverage of health insurance, the lack of a national health policy regarding adult vaccination and the economic cost that it brings to the government can all be considered as reasons for insufficient adult vaccination³⁰⁻³¹.

Bovier et al.⁵ stated that the most important reason behind missed opportunities for adult vaccination is the lack of the motivation physicians should provide to their patients. Johnson et al.⁴² reported that the reasons for low vaccination rates were; the refusal of patient to come in for controls, there being no reminding warning system for adult vaccination, and refusal of vaccination itself. Baykan et al.¹¹ found that the first three factors for low adult vaccination rates were lack of time, physicians prioritizing treatment modalities, and patients' refusal of vaccination. Nevertheless, the main factor for low adult vaccination rates remains to be the physicians' lack of knowledge.

The National Foundation for Infectious Diseases³³ noted that adult immunization schedule may not be well understood by primary health care providers. The first step toward increasing adult vaccination rates is to communicate who should be vaccinated and when. Vaccination barriers exist among healthcare providers and delivery systems.

Conclusions

Based on results of the present study, the following can be concluded:

- Knowledge of primary health care physicians in Abha City regarding adult vaccination is suboptimal.
- Most primary health care physicians do not have negative attitude toward adult vaccination.
- The practice of primary health care physicians regarding adult vaccination is mostly poor.
- Primary health care physicians' knowledge regarding adult vaccination is less among younger and Saudi physicians.
- Primary health care physicians' attitude toward adult vaccination is more positive among females, non-Saudis and those with more experience in primary health care practice.
- Primary health care physicians' practices regarding adult vaccination are better among older physicians with more experience in primary care practice.
- Primary health care physicians' most frequently stated reasons for low adult vaccination coverage are "Lack of coordinated immunization programs for adults", "Physicians do not inform patients about adult vaccination because they do not have enough time" and "Lack of availability of up-to-date records and recording systems".

Recommendations

Based on results of the present study, the following is recommended:

- To raise the awareness of the public and health care providers regarding adult vaccination.
- There is a need to construct a national guideline for adult vaccination that should comprise a coordinated immunization programs for adults with detailed indications and target groups for each vaccine.
- The Saudi Ministry of Health should plan and organize continuing medical education courses on adult vaccination for primary health care physicians.
- Obstacles against adult vaccination should be studied and overcome.
- To repeat this study in other areas of the Kingdom of Saudi Arabia so as to obtain the global view about knowledge, attitude and practice of primary health care physicians regarding adult vaccination and to identify reasons for low rates for receiving vaccines in Saudi Arabia.

Table 1: Personal characteristics of study sample

Personal characteristics	No.	%
Age group:		
• <30 years	35	34.0
• 30-40 years	46	44.7
• >40 years	22	21.4
Gender		
• Male	67	65.0
• Female	36	35.0
Nationality		
• Saudi	65	63.1
• Non-Saudi	38	36.9
Qualification		
• MBBS	67	65.0
• Diploma/Master	20	19.4
• PhD/Board/Doctorate	16	15.5
Position		
• General practitioner	49	47.6
• Resident	34	33.0
• Registrar/Senior registrar	18	17.5
• Consultant	2	1.9
Experience in PHC practice		
• <5 years	48	46.6
• 5-10 years	35	34.0
• > 10 years	20	19.4

Table 2: Physicians' correct responses regarding their knowledge about vaccines administered for some risk groups of adult patients

Risk groups	Vaccines	No. of Physicians' with Correct Responses	%
Aged >65 years	Influenza	97	94.2
	Pneumococcus	83	80.6
	Hepatitis B	34	33.0
	Tetanus	37	35.9
	Meningococcus	40	38.8
	Hepatitis A	22	21.4
	Hib	26	25.2
Living with or providing care for a child <5 years	Influenza	81	78.6
	Pneumococcus	52	50.5
	Hepatitis B	48	46.6
	Tetanus	32	31.1
	Meningococcus	48	46.6
	Hepatitis A	44	42.7
	Hib	46	44.7
Pregnancy	Influenza	84	81.6
	Pneumococcus	23	22.3
	Hepatitis B	26	25.2
	Tetanus	66	64.1
	Meningococcus	16	15.5
	Hepatitis A	18	17.5
	Hib	22	21.4
Pilgrim	Influenza	73	70.9
	Pneumococcus	34	33.0
	Hepatitis B	8	7.8
	Tetanus	14	13.6
	Meningococcus	57	55.3
	Hepatitis A	26	25.2
	Hib	20	19.4
Health personnel	Influenza	91	88.3
	Pneumococcus	55	53.4
	Hepatitis B	89	86.4
	Tetanus	52	50.5
	Meningococcus	54	52.4
	Hepatitis A	40	38.8
	Hib	30	29.1

Table 3: Primary health care physicians' correct responses regarding their knowledge about vaccines suggested to some disease groups among adult patients

High risk groups	No. of Physicians' with Correct Responses	%
Immune deficiency		
• Influenza	93	90.3
• Pneumococcus	73	70.9
• Hepatitis B	46	44.7
• Tetanus	27	26.2
• Meningococcus	45	43.7
• Hepatitis A	12	11.7
Diabetes mellitus		
• Influenza	101	98.1
• Pneumococcus	81	78.6
• Hepatitis B	44	42.7
• Tetanus	38	36.9
• Meningococcus	42	40.8
• Hepatitis A	30	29.1
Chronic liver disease		
• Influenza	73	70.9
• Pneumococcus	53	51.5
• Hepatitis B	42	40.8
• Tetanus	32	31.1
• Meningococcus	41	39.8
• Hepatitis A	45	43.7
Kidney dialysis		
• Influenza	79	76.7
• Pneumococcus	61	59.2
• Hepatitis B	56	54.4
• Tetanus	30	29.1
• Meningococcus	32	31.1
• Hepatitis A	39	37.9

Table 4: Primary health care physicians' attitude regarding adult vaccination

Statement	Agree		Neutral		Disagree	
	No.	%	No.	%	No.	%
Vaccinating adults is a modality of protection	93	90.3	10	9.7	0	0.0
There has to be a vaccination scheme for adults, like the one in childhood	56	54.4	38	36.9	9	8.7
There is no need to establish antibody levels before hepatitis B vaccination	28	27.2	15	14.6	60	58.3
Adult patients should be asked about vaccination coverage	40	38.8	39	37.9	24	23.3
Pregnant woman should be asked about vaccination coverage during examination	87	84.5	10	9.7	6	5.8
It is important to ask elderly patients about vaccination coverage	64	62.1	27	26.2	12	11.7
There is a need to ask patients at risk about vaccination coverage	76	73.8	25	24.3	2	1.9
I think that my knowledge about adult vaccination to be insufficient	26	25.2	45	43.7	32	31.1

Table 5: Primary health care physicians' practices related to adult vaccination

Practices related to adult vaccinations	No. of Physicians' Practices	%
Having been vaccinated		
• Influenza	78	75.7
• Hepatitis B	78	75.7
• Pneumococcus	22	21.4
• Tetanus	42	40.8
• HPV	14	13.6
Vaccinate the first degree relatives		
• Influenza	58	56.3
• Hepatitis B	42	40.8
• Pneumococcus	12	11.7
• Tetanus	26	25.2
• HPV	10	9.7
Suggestion to the patient		
• Influenza	89	86.4
• Hepatitis B	63	61.2
• Pneumococcus	61	59.2
• Tetanus	74	71.8
• HPV	40	38.8

Table 6: Primary health care physicians' knowledge grades regarding adult vaccination according to their personal characteristics

Personal characteristics	Poor		Moderate		Good		P Value
	No.	%	No.	%	No.	%	
Age group:							<0.001
• <30 years	29	82.9	2	5.7	4	11.4	
• 30-40 years	36	78.3	10	21.7	0	0.0	
• >40 years	10	45.5	10	45.5	2	9.1	
Gender							0.180
• Male	47	70.1	14	20.9	6	9.0	
• Female	28	77.8	8	22.2	0	0.0	
Nationality							0.001
• Saudi	52	80.0	7	10.8	6	9.2	
• Non-Saudi	23	60.5	15	39.5	0	0.0	
Qualification							0.290
• MBBS	53	79.1	12	17.9	2	3.0	
• Diploma/Master	12	60.0	6	30.0	2	10.0	
• PhD/Board/Doctorate	10	62.5	4	25.0	2	12.5	
Position							0.588
• Resident	24	70.6	6	17.6	4	11.8	
• General practitioner	35	71.4	12	24.5	2	4.1	
• Registrar/Senior registrar	13	72.2	5	27.8	0	0.0	
• Consultant	2	100.0	0	0.0	0	0.0	
Experience in PHC practice							0.113
• <5 years	38	79.2	6	12.5	4	8.3	
• 5-10 years	25	71.4	8	22.9	2	5.7	
• > 10 years	12	60.0	8	40.0	0	0.0	

Table 7: Primary health care physicians' attitude grades regarding adult vaccination according to their personal characteristics

Personal characteristics	Negative		Neutral		Positive		P Value
	No.	%	No.	%	No.	%	
Age group:							0.349
• <30 years	4	11.4	19	54.3	12	34.3	
• 30-40 years	6	13.0	22	47.8	18	39.1	
• >40 years	0	0.0	10	45.5	12	54.5	
Gender							0.013
• Male	10	14.9	35	52.2	22	32.8	
• Female	0	0.0	16	44.4	20	55.6	
Nationality							0.004
• Saudi	9	13.8	37	56.9	19	29.2	
• Non-Saudi	1	2.6	14	36.8	23	60.5	
Qualification							0.547
• MBBS	8	11.9	31	46.3	28	41.8	
• Diploma/Master	0	0.0	12	60.0	8	40.0	
• PhD/Board/Doctorate	2	12.5	8	50.0	6	37.5	
Position							0.001
• Resident	2	5.9	20	58.8	12	35.3	
• Registrar/Senior registrar	0	0.0	8	44.4	10	55.6	
• General practitioner	6	12.2	23	46.9	20	40.8	
• Consultant	2	100.0	0	0.0	0	0.0	
Experience in PHC practice							0.044
• <5 years	6	12.5	27	56.3	15	31.3	
• 5-10 years	4	11.4	18	51.4	13	37.1	
• > 10 years	0	0.0	6	30.0	14	70.0	

Table (8): Primary health care physicians' practice grades regarding adult vaccination according to their personal characteristics

Personal characteristics	Poor		Moderate		Good		P Value
	No.	%	No.	%	No.	%	
Age group:							<0.001
• <30 years	27	77.1	6	17.1	2	5.7	
• 30-40 years	39	84.8	5	10.9	2	4.3	
• >40 years	6	27.3	10	45.5	6	27.3	
Gender							0.215
• Male	49	73.1	14	20.9	4	6.0	
• Female	23	63.9	7	19.4	6	16.7	
Nationality							0.102
• Saudi	50	76.9	11	16.9	4	6.2	
• Non-Saudi	22	57.9	10	26.3	6	15.8	
Qualification							0.018
• MBBS	49	73.1	10	14.9	8	11.9	
• Diploma/Master	9	45.0	9	45.0	2	10.0	
• PhD/Board/Doctorate	14	87.5	2	12.5	0	0.0	
Position							0.457
• Resident	22	64.7	6	17.6	6	17.6	
• Registrar/Senior registrar	13	72.2	5	27.8	0	0.0	
• General practitioner	35	71.4	10	20.4	4	8.2	
• Consultant	2	100.0	0	0.0	0	0.0	
Experience in PHC practice							0.009
• <5 years	34	70.8	10	20.8	4	8.3	
• 5-10 years	28	80.0	7	20.0	0	0.0	
• > 10 years	10	50.0	4	20.0	6	30.0	

Table (9): Opinions of primary health care physicians regarding possible causes of low adult vaccination rates

Opinion	Agree		Neutral		Disagree	
	No.	%	No.	%	No.	%
Physicians do not inform patients about adult vaccination because they do not have enough time	63	61.2	16	15.5	24	23.3
Physicians prioritize treatment	51	49.5	30	29.1	22	21.4
Patients refuse vaccination	24	23.3	33	32.0	46	44.7
Health care providers lack knowledge about adult immunization and recommended vaccines	42	40.8	36	35.0	25	24.3
Physicians' disbelief in adult vaccination	10	9.7	18	17.5	75	72.8
Misrepresentation/misunderstanding of the risks of vaccine and benefits of disease prevention in adults	21	20.4	50	48.5	32	31.1
Lack of understanding of vaccine safety and efficacy	18	17.5	45	43.7	40	38.8
Missed opportunities for vaccination in health care providers' offices, hospitals and nursing homes	46	44.7	33	32.0	24	23.3
Lack of publicly-funded vaccine and reimbursement to vaccine providers	35	34.0	50	48.5	18	17.5
Lack of coordinated immunization programs for adults	65	63.1	26	25.2	12	11.7
Lack of regulatory or legal requirements	35	34.0	40	38.8	28	27.2
Fear of injections	22	21.4	41	39.8	40	38.8
Lack of availability of up-to-date records and recording systems	57	55.3	32	31.1	14	13.6

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