

Adult Immunization Among Health Care Personnel and Target Groups in Iran

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Background: Immunization is an essential issue in primary health care, which has a tremendous impact on infection prevention.
Objectives: This study aimed to determine the immunization status of health care personnel (HCP) and adult patients admitted at teaching hospitals.
Patients and Methods: A total of 1506 HCP and patients were enrolled according to 13 target groups. The immunization profile was evaluated based on adjusted recommendations of Advisory Committee on Immunization Practices (ACIP) according to the available vaccines in Iran.
Results: The rate of immunization was more than 50% only in hepatitis B vaccination among HCP (64.5%) and tetanus-diphtheria (Td) booster dose among HCP and pregnant women (54.6% and 72.9%, respectively). The other vaccines according to the target groups had no acceptable rate, especially with respect to influenza and pneumococcal vaccinations among patients with underlying chronic diseases.
Conclusions: The low rate of immunization warrants implementation of novel protocols in adults as well as implying on educational programs in Iran.

Keywords: Immunization; Vaccine; Patient; Adulthood

1. Background

Nowadays, because of high immunization rate among infants and children, preventable childhood infections rarely occur, especially in developed countries (1). In April 2011, about 180 countries and territories across five WHO regions celebrated the Immunization Week; nevertheless, there are regions with low rates of vaccinations that urged health systems to provide required facilities. Dr Margaret Chan, WHO Director-General in her 2011 Immunization Week statement regarding the recent outbreaks of measles, pertussis, and polio in different parts of the world affirmed “the risk of losing many of the gains that have been made and forgoing the additional benefits that are within reach of WHO” (2).

The Standards for Adult Immunization Practices were first published in the United States in 1990, and since then they have been revised according to ever-changing health care knowledge (3). ACIP related to The Centers for Disease Control and Prevention (CDC), was published a similar adult immunization schedule and regularly revised it as well as ACIP immunization schedule (4). Unfortunately, similar programs have not been officially integrated into health system policies in other countries such as Iran; therefore, global status of adults' immunization has been inappropriate so far.

Despite the aforementioned standards in developed countries such as US, the parallel success and development of childhood vaccination has not been achieved in adults. In Iran, tetanus and diphtheria booster dose during pregnancy and hepatitis B vaccinations have been formally implanted in health care systems; the other vaccines for adults including influenza and pneumococcal are available and recommended for indicated persons, and some others are neglected almost entirely such as measles, mumps, and rubella as well as varicella.

2. Objectives

We conducted this study to clarify the status of adult vaccination in Iran to establish a proper background data and to help the health systems make official and formal decision in this regard.

3. Patients and Methods

A total of 1506 participants were selected using cluster stratified sampling among adults, including HCP and patients admitted to the teaching hospitals of Shahid Beheshti University of Medical Sciences (Iran, 2012). The target-groups and immunization schedule are shown in Table 1. Required vaccines based on each target-group was retrieved from ACIP and CDC (4); and adjusted according

Table 1. Recommended Vaccines Based on Different Target-Groups and Populations

	Influenza	Pneumococcal Polysaccharide	Hepatitis B	Td Booster
Cardiovascular disorders	Yes	Yes	No	No
Pulmonary diseases ^a	Yes	Yes	No	No
Chronic liver diseases	Yes	No	Yes	No
Diabetics	Yes	Yes	No	No
Chronic kidney diseases or nephrotic syndrome	Yes	Yes	No	No
Hemodialysis	Yes	Yes	Yes	No
Health care personnel	Yes	No	Yes	Yes
Intravenous drug users	No	No	Yes	No
Agegroup ≥ 65	Yes	Yes	No	Yes
Agegroup 50-65	Yes	No	No	Yes
Coagulation factors recipients	No	No	Yes	No
Immunocompromised patients	Yes	Yes	No	No
Pregnant	Yes ^b	No	No	Yes

^a Asthma and Chronic obstructive pulmonary diseases.

^b Pregnancy during influenza outbreak seasons.

Table 2. Demographic and Target-Group Distribution of Participants^a

Variable	Amount
Literacy	
Post-graduate	1.5
Graduate	31.1
Under-graduate	67.4
Occupation	
Student	7.4
Worker	2.9
Governmental	15.9
Housewife or unemployed	45
Other	29
Agegroup, y	
15-30	16.7
31-45	10
46-65	45.2
≥ 65	28.1
Marital status	
Single	12
Married	87.5
Divorced	0.2
Widow	0.3
Cardiovascular disorders	215 (14.3)
Pulmonary diseases	79 (5.2)
Chronic liver diseases	20 (1.3)
Diabetics	173 (11.5)
Chronic kidney diseases	123 (8.2)
Hemodialysis	70 (4.6)
Health care personnel	174 (11.6)
Intravenous drug users	32 (2)
Age group ≥ 65 y	160 (10.6)
Age group 50-65 y	190 (12)
Coagulation factors recipients	32 (2.1)
Immunocompromised patients	168 (11.2)
Pregnant	70 (4.6)

^a Data are presented as percent or No (%).

to the available vaccines in Iran (Table 1). The patients with hemoglobinopathy or history of splenectomy were ignored due to small sample size. A checklist was used for collecting the supplementary data, including age, gender, occupation, and other demographic data in addition to vaccinations profile.

4. Results

The mean age of participants was 53.5 ± 17.6 y (range: 15-84 y). Also 771 of them (51.2%) were male and 735 (48.8%) cases were female. Other demographic data are shown in Table 2. The overall proportion of recommended group-specific vaccinations disclosed unacceptable and inappropriate circumstances. Less than half of the individuals in each group were immunized with recommended vaccines with the exception of a few. Detailed percentages of pneumococcal, influenza, Hepatitis B, and Td booster vaccinations according to the specific groups are shown in Tables 3 - 6. The rate of pneumococcal immunization revealed a neglected situation among target patients. The cases with underlying diseases, including pulmonary diseases, cardiovascular complications, diabetics, chronic kidney diseases, and patients with maintenance hemodialysis have been immunized 1.3%, 1.4%, 1.2%, 0.8%, and 1.4%, respectively. None of the immunocompromised patients and those with chronic liver diseases have been vaccinated. Among elderly cases (age ≥ 65) only 1.3% had a history of pneumococcal vaccination. The prevention of pneumococcal infections had been overlooked in all groups. Influenza vaccination rate among target persons, including HCP was less than 30% and limited to one year without annual repetition (more than 70%) (Table 3).

The status of hepatitis B vaccination among HCP had fairly better situation but not at optimal condition. Less than half of HCP followed the immunologic response. In the other important target-group (hemodialysis-dependent patients) who needed vaccination and checking the immunologic response, the status was unacceptable

Table 3. Influenza Vaccination Status Among Participant in 2012 and Previous Immunization Rate ^a

Target group	Yes				No
	Overall	First time	Second time	Third time	
Pulmonary diseases	29.1	78	13	9	70.9
Cardiovascular disorders	11.2	83	17	0	88.8
Diabetics	11.6	80	15	5	88.4
Chronic kidney diseases	14.6	83	5	12	85.4
Hemodialysis	18.6	69	23	9	81.4
Health care personnel	18.4	84	12	4	81.6
Agegroup ≥ 65	11.9	78	15	7	88.1
Agegroup 50-65	5.5	90	10	0	94.5
Immunocompromised patients	7.1	75	16	9	92.9
Pregnant	10	85	15	0	90

^a Data are presented as percent (%).

Table 4. Hepatitis B Vaccination Rate ^a

	Chronic Kidney Diseases	Hemodialysis	Health Care Personnel	Intravenous Drug Users	Coagulation Factors Recipients
Vaccination status					
Yes	35	55.7	86.2	21.9	18.8
No	65	44.3	13.8	78.1	81.3
3-dose vaccination					
Yes	60	44.3	75.9	6	53
No	40	55.7	24.1	94	47

^a Data are presented as percent (%).

Table 5. Evaluation of the Response to Hepatitis B Vaccine ^a

	Yes	No
Hemodialysis	46	54
Health care personnel	48	52

^a Data are presented as percent (%).

Table 6. Td Booster Vaccination Rate ^a

	Yes	No
Health care personnel	54.6	45.4
Age-group ≥ 65 y	7.5	92.5
Age-group 50-65 y	6.4	93.6
Pregnant	72.9	27.1

^a Data are presented as percent (%).

(Tables 4 and 5). Among the cases that Td booster dose was indicated, pregnant women had the highest rate of immunization. Moreover, all of tetanus vaccinations among 50-65 and ≥ 65 age-groups had been prophylactic after trauma. Furthermore, they did not know the importance of 10-year repetition of the vaccine (Table 6).

Only 13% of pregnant women who had no history of influenza or tetanus vaccination (82 cases) intended to receive them during their pregnancy.

5. Discussion

In summary, statistics analysis of this study data revealed unacceptable and inappropriate status of recommended vaccinations, available in Iran among adults, including HCP and other cases with specific underlying diseases. This study stated that adult immunization is a neglected issue in health care system, and except for hepatitis B vaccination (similar to other studies in Iran) (5), the status of this program is not desirable even among HCP who seems to be aware of and well-educated about the importance of immunization, and generally the health service is more accessible than other groups for them. Recommended vaccination schedule during infancy and childhood is a national integrated health program in Iran, as well as hepatitis B and Td vaccines among high risk groups, including HCP and pregnant women. But pneumococcal and influenza vaccines are not implanted at national level but available in private enterprises; varicella vaccine is not achievable so far (6, 7). "Healthy People", a national agenda from the US Department of Health and Human Services for Disease Prevention and Health Promotion, describe the goals for adult immunization every 10 years. In 2010, the target was 90% coverage for annual influenza immunization among adults (aged more than 65 years) and for pneumococcal vaccine (1, 8).

The results of 2010 National Health Interview Survey (NHIS) revealed increases in coverage only for Td vaccination among adults (19-64 y) (1.6% vs. 8.2%), zoster vaccination among elderly populations (≥ 60 y) (4.4% vs. 14.4%), and HPV vaccination in women aged 19-26 years (3.6% vs. 20.7%) without any increment of coverage for the other vaccines ($< 70\%$). According to the published data in Morbidity and Mortality Weekly (MMWR) Report, improvement of the adult immunization coverage among adults has not been remarkable in the US so far (8).

According to the CDC estimation, influenza vaccination of one million of old population, decreases 900 deaths and 1300 hospitalizations annually (9). More than 100000 and 60000 cases of hospitalizations for pneumonia and bacteremia and other forms of invasive disease, respectively, and 7000 deaths have been reported in America, particularly among old individuals (1). Therefore, pneumococcal vaccination seems to have a high and acceptable coverage, especially in elderly people and even among other medically indicated adults. However, despite of increment in early 2000, the coverage rates were only 66% and 50% for influenza and pneumococcal vaccines, respectively, in America (1).

Despite the higher-level coverage of hepatitis B immunization in developed countries compared to other recommended vaccines for adults, data indicates 80000 recently infected persons in the USA annually (10). Hepatitis B vaccine is regularly available for infants in Iran, and also cross-sectional programs were performed for adolescents in recent decade (7). Although these services decreased the level of hepatitis B incidence; Iranian adults as well as high-risk individuals were not immune properly so far. Risk of new cases of hepatitis B, cirrhosis, and liver neoplasm ring the bells for health system providers.

Moreover, adults should be immune to measles, mumps, rubella (MMR), tetanus, diphtheria (Td), and varicella as well as hepatitis A and polio, when there is a risk for exposure, particularly among HCP (11). All of them are recommended by ACIP and the Healthcare Infection Control Practices Advisory Committee (HICPAC) for vaccinating HCP in the United States. MMR and Td vaccination are performed properly and routinely in Iran since many years ago, but there is not enough data for immune status of adults, which needs to more attention in this regard.

The standards for adult immunization practices are summarized in the following instructions: 1) make vaccinations available, 2) assess patients' vaccination status, 3) communicate effectively with patients, 4) administer and document vaccinations properly, 5) administer indicated vaccine doses, 6) Implement strategies to improve

vaccination rates, and 7) partner with the community (8).

Continuous researches seem to be fundamental to implement all of the above instructions by health care providers and professionals, whether public or private, as well as providing crucial steps and programs to develop health determinants in communities. Obviously in each country the standards must be described in details and adjusted properly according to the health system policies, compliance, and financial issues. To sum up, this study concludes a proper, accurate, and multidisciplinary revision in immunization program for adults in Iran regarding the inappropriate and sometimes neglected vaccinations rates, which is a proven and acceptable tool for improving the health in community.

Authors' Contributions

Study concept and design: Shervin Shokouhi; Acquisition of data: Golsa Kardan; Analysis and interpretation of data: Ilad Alavi Darazam; Drafting of the manuscript: Ilad Alavi Darazam; Critical revision of the manuscript for important intellectual content: Ilad Alavi Darazam, Shervin Shokouhi; Statistical analysis: Ilad Alavi Darazam; Administrative, technical, and material support: Ilad Alavi Darazam, Shervin Shokouhi; and Study supervision: Ilad Alavi Darazam, Shervin Shokouhi.

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