

## Original Article

### Chapter Four: Level of Nurses Knowledge Regarding Adverse Events Post Immunization at the Health Care Centers in the Northwest of Jerusalem District

Hadi Dar Badwan\*, Sabri Jamhour, Aysha Faqeeh, Refqa Hoshia and Liana Taha

Faculty of Nursing & Health Sciences, Bethlehem University, Bethlehem, Palestine

#### Abstract

**Background:** Childhood immunization against common childhood diseases is the most powerful public health strategy to keep children healthy. It has been the most cost-effective public health intervention, saving an estimated 2–3 million lives around the world each year. However, because no vaccine is 100% safe and effective, so adverse events post-immunization may occur. These adverse events are any untoward medical occurrences that occur following immunization and do not necessarily have a causal relationship with the use of the vaccine. Moreover, if not rapidly and effectively dealt with it, it can undermine confidence in a vaccine and ultimately have dramatic consequences for immunization coverage and disease incidence.

**Purpose:** The purpose of this study was to determine the level of nurse's knowledge regarding adverse events post immunization at the health care centers in the northwest of Jerusalem district.

**Methodology:** Study designs: A descriptive cross-sectional study design was used. **Study population:** The study population consists of all of community health nurses who are working at health care centers in the northwest of Jerusalem district. **Study sample:** The study sample was consisted of community health nurses that working in this area and who did not administer the vaccination. A convenience sampling method was used to collect data, so, the number of nurses who enrolled in our study was 40 nurses. **Setting:** This study was conduct at health care centers in the northwest of Jerusalem district

\*Corresponding author: Hadi Dar Badwan, Faculty of Nursing & Health Sciences, Bethlehem University, Bethlehem, Palestine, E-mail: hadbad446@gmail.com

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from 1st of December to the end of December of 2022. **Study tools:** The study tool that used in our study was the questionnaire tool. **Study strategies for analysis:** The collected data was analyzed by the Statistical Package for Social Sciences (SPSS) Version (28).

**Results:** The results of the research show that more than two-thirds of nurses were female and held Bachelor's Degree, and more than half of nurses aged 21-30 years old and have 1-4 years old experience. Almost two-thirds of nurses 62.5% have good knowledge, while 37.5% of nurses have poor knowledge, also it found that the nurses who work in governmental clinics have more knowledge score than others nurses ( $p < 0.001$ ).

**Recommendations:** This study recommended to establish an educational program in health care centers to improve the nurse's knowledge regarding adverse events post-immunization and also for nursing students in universities and colleges. Furthermore, routinely validate staff's knowledge and competencies regarding vaccine administration and its adverse events were suggested.

**Keywords:** Adverse events post immunizations; Immunization; knowledge; Community health nurses; Vaccination; AEFI

#### Introduction

This chapter includes the description of the results for this study, and in order to facilitate the interpretation of the results, the research team relies on percentages. Moreover, this chapter tested the hypothesis.

#### Results

Table 1 illustrates the socio-demographic variables of nurses. More than two-thirds of nurses were female, and almost two-thirds held bachelor's degrees. More than half of nurses are aged 21-30 years old and have 1-4 years of experience. 42.5% of nurses were in private health centers. Most nurses hear about the adverse events post immunization. Moreover, almost two-thirds of nurses have not attended any courses related to vaccination.

Variable		N	%
Gender	Male	7	17.5
	Female	33	82.5
Age	21-30 years old	21	52.5
	31-40 years old	14	35.0
	> 40 years old	5	12.5
Educational level	Diploma	15	37.5
	Bachelor's Degree	25	62.5
	Master Degree	0	0
	PhD	0	0
Years of experience	1-4 years	21	52.5
	5-8 years	2	5.0
	9-12 years	4	10.0

	> 12 years	13	32.5
Type of health care center	Governmental	12	30.0
	Private	17	42.5
	UNURWA	5	12.5
	NGO's	6	15.0
Did you hear about the Adverse Events Post immunization?	Yes	38	95.0
	No	2	5.0
Previous course toward vaccination	Yes	15	
	No	25	62.5

**Table 1:** Socio-demographic variables of nurses (n= 40).

Table 2 shows the frequency and percentages for each item related to general knowledge about vaccination among nurses. All nurses 100% were answered correctly that vaccinations stimulate the human body's natural immune system to combat pathogens such as bacteria and viruses. However, more than half of nurses incorrectly answered that vaccines are given by injection, either into a muscle or into a vein, while others are administered orally or by spraying them into the nose. More details are presented in table 2.

Information	Correct		Incorrect	
	N	%	n	%
1) Vaccinations stimulate the human body's natural immune system to combat pathogens such as bacteria and viruses	40	100.0	0	0
2) Vaccinations confer an individual's lifelong immunity against the disease.	21	52.5	19	47.5
3) Vaccination is a simple, safe, and effective way to protect people from harmful diseases before they are exposed to them.	37	92.5	3	7.5
4) Vaccines are given by injection, either into a muscle or into a vein, while others are administered orally or by spraying them into the nose.	17	42.5	23	57.5
5) The vaccines contain germs that have been killed or weakened, and if they are given to a healthy person, they trigger the immune system to form immunity against these germs.	37	92.5	3	7.5

**Table 2:** Frequency and percentages for each item toward general knowledge about vaccination among nurses (n=40).

Table 3 shows the frequency and percentages of correct and incorrect answers toward knowledge about the possible causes of adverse events post immunization among nurses. An 87.5% of nurses were answered correctly that one of the causes of adverse events post immunization is the use of improperly stored vaccine. However, almost two-thirds of nurses were incorrectly answered that adverse events post immunization cannot be related to anxiety that existed before taken the vaccine. More details are presented in table 3.

Information		Correct		Incorrect	
		n	%	N	%
1)	The wrong dose of vaccine is one of the causes of adverse events post immunization.	28	70	12	30
2)	Injection at the improper site or through the improper routes is one of the causes of adverse events post- immunization.	28	70	12	30
3)	Proper sterilization of the syringe, needle, and vaccination site helps to prevent the adverse events that may occur post-immunization.	17	42.5	23	57.5
4)	Reconstitution (dissolving) of vaccines with improper diluents is one of the causes of adverse events post immunization.	21	52.5	19	47.5
5)	Using the wrong amount of diluents is one of the causes of adverse events post immunization.	20	50	20	50
6)	Use of a vaccine suspected of being contaminated with another vaccine or diluents is not considered a cause of adverse events post immunization.	30	75	10	25
7)	One of the causes of adverse events post immunization is the use of improperly stored vaccine.	35	87.5	5	12.5
8)	Adverse events post immunization cannot be related to anxiety that existed before taken the vaccine.	9	22.5	31	77.5
9)	Adverse events post immunization as medical conditions are limited to vaccination alone.	17	42.5	23	57.5
10)	Giving vaccination to people with autoimmune disorders is one of the causes of adverse events post- immunization.	11	27.5	29	72.5
11)	The reaction of the immune system to the immunization process is the causes of adverse events post-immunization.	34	85	6	15
12)	One of the causes of adverse events post- immunization is storing vaccines in the refrigerator at a temperature between 10-15°C.	16	40	24	60
13)	One of the causes of adverse events post- immunization is storing opened vaccine vials in the refrigerator for the next day's session.	15	37.5	25	62.5

**Table 3:** Frequency and percentages for each item toward knowledge about the possible causes of adverse events post immunization among nurses (n=40).

Table 4 shows the frequency and percentages of correct and incorrect answer toward knowledge about signs and symptoms of adverse events post immunization among nurses. An 95% of nurses were answered correctly that Pain, swelling, and redness are normal

local reaction at the injection site post vaccination. However, more than two-thirds of nurses were incorrectly answered that vaccinations can lead to lung infection. More details are presented in table 4.

Information	n	Correct		Incorrect	
		%	N	%	
1) GI symptoms and headache are the most common adverse events post-immunization.		18	45	22	55
2) Shock and convulsions are usual to happen after vaccination.		26	65	14	35
3) Generalized skin reactions such as rash and pruritus are common adverse events post-immunization.		26	65	14	35
4) Chest pain and Tachypnea are a minor adverse events post-immunization.		32	80	8	20
5) The diphtheria and pertussis vaccine increases the risk of sudden infant death syndrome.		19	47.5	21	52.5
6) Swelling of the face and throat is abnormal signs after vaccination.		25	62.5	15	37.5
7) Patients who are on immunosuppressive agents are at lower risk of having bad adverse events post-immunization.		28	70	12	30
8) Vaccination can lead to cancer.		35	87.5	5	12.5
9) All vaccines cause headaches, exhaustion, and a loss of appetite.		26	65	14	35
10) Minor adverse events of the measles and MMR vaccine appear immediately after immunization.		21	52.5	19	47.5
11) Vaccinations can lead to lung infection.		9	22.5	31	77.5
12) Pain, swelling, and redness are normal local reaction at the injection site.		38	95	2	5
13) Persistent crying following immunization that lasts for three or more hours is consider normal.		19	47.5	21	52.5

Table 4: Frequency and percentages for each item toward knowledge about signs and symptoms of adverse events post immunization among nurses (n=40).

Table 5 shows the frequency and percentages of correct and incorrect answers toward knowledge about the ways to reduce the appearance of adverse events post immunization among nurses. An 77.5% of nurses were answered correctly that putting a warm water compress on the injection site exacerbates the appearance of adverse events post-immunization. On the other hand, more than two-thirds of nurses 72.5% was incorrectly answered that skin at injection site should be always stretched during IM injection. More details are presented in table 5.

Information	Correct		Incorrect	
	n	%	n	%
1) The vaccination site should be rubbed after the immunization process to reduce the appearance of adverse events.	26	65	14	35
2) Vaccines vials should be taken out from the refrigerator only at the arrival of the first child for that immunization session.	18	45	22	55
3) Giving vaccine intravenously is one of the ways to reduce the appearance of adverse events post-immunization.	28	70	12	30
4) Skin at injection site should be always stretched during IM injection.	11	27.5	29	72.5
5) All vaccines should be frozen.	28	70	12	30
6) The nurse should wait for the alcohol to dry before giving the injection.	28	70	12	30
7) Putting a warm water compress on the injection site exacerbates the appearance of adverse events post-immunization.	31	77.5	9	22.5
8) Some dissolved vaccine tube should be destroyed after six to eight hours from the time of dissolution.	30	75	10	25

Table 5: Frequency and percentages for each item toward knowledge about the ways to reduce the appearance of adverse events post immunization among nurses (n=40).

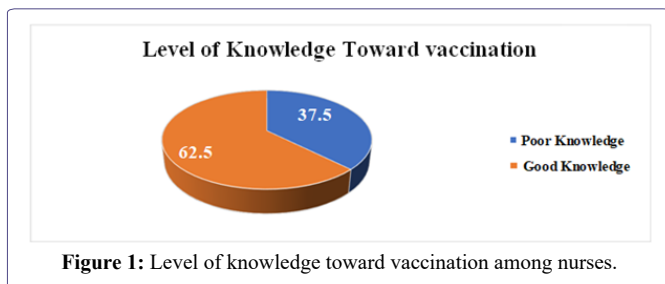
Table 6 shows the frequency and percentages of correct and incorrect answers toward knowledge about the possible precautions and contraindications for vaccinations in order to reduce the appearance of adverse events among nurses. An 95 % of nurses were answered correctly that vaccination of children suffering from colds and coughs should be postponed until they have fully recovered. On the other hand, an 95% of nurses were incorrectly answered that necessary precautions should be taken before giving MMR vaccine to children with severe allergy to eggs. More details are presented in table 6.

Information		Cor-rect	n	Incor-rect	
		%		%	
1) People with permanent damage to the nervous system should not be vaccinated.		17	42.5	23	57.5
2) Vaccinations should not be given to children with acute and severe diarrhea.		33	82.5	7	17.5

3)	Necessary precautions should be taken before giving MMR vaccine to children with severe allergy to eggs.	2	5	38	95
4)	Vaccination of children suffering from colds and coughs should be postponed until they have fully recovered.	38	95	2	5
5)	It is contraindicated to give a pertussis or measles vaccine to a person with a family history of convulsive disease or any other nervous system disease.	11	27.5	29	72.5
6)	A severe anaphylactic reaction to a vaccine contraindicates further doses of that vaccine.	31	77.5	9	22.5
7)	It is okay to give the vaccine to children with an oral temperature of less than 38 °C.	21	52.5	19	47.5
8)	The important Immunizations shall not be postponed in patient with febrile illness or acute infections.	35	87.5	5	12.5
9)	Vaccination is not contraindicated in children who suffer longstanding respiratory, cardiovascular, or liver diseases and having a stable health.	27	67.5	13	32.5
10)	Children who come into contact with a child who has measles should not receive the measles vaccination.	28	70	12	30
11)	One of the contraindications for reusing the same vaccine is redness and swelling after the first vaccination.	28	70	12	30

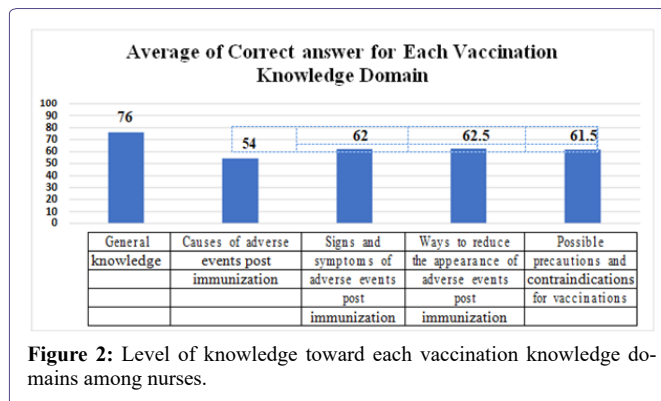
**Table 6:** Frequency and percentages for each item toward knowledge about the possible precautions and contraindications for vaccinations in order to reduce the appearance of adverse events among nurses (n=40).

Figure 1 presented the level of knowledge toward vaccination among nurses. Almost two-thirds of nurses 62.5% have good knowledge, while 37.5% of nurses have poor knowledge.



**Figure 1:** Level of knowledge toward vaccination among nurses.

Figure 2 shows the average of correct answer toward vaccination knowledge domains. The highest average correct score were general knowledge and way to reduce the appearance of adverse events of vaccination with 76% and 62.5% respectively.



**Figure 2:** Level of knowledge toward each vaccination knowledge domains among nurses.

## Testing the Hypothesis

### Hypothesis one

Table 7 illustrates the differences between nurse's gender in terms of knowledge sum score. The Independent t-test indicated no significant differences among gender (p=0.094). This means male and female have same knowledge scores.

Variable		N	M	SD	t	P-value
Gender	Male	7	25.85	7.625	-1.933	0.094
	Female	33	31.66	4.909		

**Table 7:** Differences between nurse's gender in terms of knowledge sum score (n=40).

### Hypothesis two

Table 8 illustrates the differences between nurse's age group in terms of knowledge sum score. The One Way ANOVA indicated no significant differences among age group (p=0.072). This means all age group have same knowledge scores.

Variable		N	M	SD	F	P-value
Age	21-30 years old	21	28.66	6.311	2.827	.072
	31-40 years old	14	32.92	4.746		
	> 40 years old	5	32.60	3.577		

**Table 8:** Differences between nurse's age group in terms of knowledge sum score (n=40).

### Hypothesis three

Table 9 illustrates the differences between nurse's level of education in terms of knowledge sum score. The Independent t-test indicated no significant differences among education level (p=0.266). This means nurses held Diploma and Bachelor's Degree have same knowledge scores.

Variable	n	M	SD	T	P-value
Educational level Diploma	15	31.8	3.468	1.392	0.266
Bachelor's Degree	25	29.96	6.815		

Master	-	-	-		
Degree					
PhD	-	-	-		

**Table 9:** Differences between nurse's level of education in terms of knowledge sum score (n=40).

### Hypothesis four

Table 10 illustrates the differences between nurse's years of experience in terms of knowledge sum score. The One Way ANOVA indicated no significant differences among years of experience ( $p=0.120$ ). This means all nurses experience have same knowledge scores.

Variable		n	M	SD	F	P-value
Years of experience	1-4 years	21	29	6.41	2.077	0.12
	5-8 years	2	27	4.242		
	9-12 years	4	34.25	6.751		
	> 12 years	13	32.76	3.467		

**Table 10:** Differences between nurse's years of experience in terms of knowledge sum score (n=40).

### Hypothesis five

Table 11 illustrates the differences between health care types in terms of knowledge sum score. The One Way ANOVA indicated a significant difference between type of health care center ( $p<0.001$ ). The Tukey post-hoc test shown that nurses work in governmental clinics have more knowledge score than private clinics.

Variable		N	M	SD	F	P-value
Type of health care center	Governmental	12	34.83	3.973	9.058	<0.001*
	UNURWA	5	30.20	5.019		
	Private	17	26.58	5.327		
	NGO's	6	34.16	2.041		

**Table 11:** Differences between types of health care center in terms of knowledge sum score (n=40).

### Hypothesis six

Table 12 illustrates the differences between hearing about the Adverse Events Post immunization in terms of knowledge sum score. The Independent t-test indicated no significant difference between hearing about the Adverse Events Postimmunization ( $p=0.055$ ). This means nurses who hear and who not hear about the Adverse Events Post immunization have same knowledge score.

Variable		N	M	SD	t	P-value
Did you hear about the Adverse Events	Yes	38	31.05	5.362	1.982	.055
	No	2	23.00	11.313		
Post immunization?						

**Table 12:** Differences between hearing about the Adverse Events Post immunization in terms of knowledge sum score (n=40).

### Hypothesis Seven

Table 13 illustrates the differences between previous courses toward vaccination in terms of knowledge sum score. The Independent t-test indicated no significant difference between previous courses toward vaccination ( $p=0.901$ ). This means nurses who have and who not have previous courses toward vaccination have same knowledge score.

Variable		N	M	SD	t	P-value
Previous course	Yes	15	30.80	5.226	0.125	.901
Toward vaccination	No	25	30.56	6.232		

**Table 13:** Differences between hearing about the previous course toward vaccination in terms of knowledge sum score (n=40).

### Summary

This chapter illustrated the results of the study and tested the seven hypotheses.

### Acknowledgement

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