

Assessment of Nurses Performance Regarding Penicillin Administration for Pediatric Patients

Asmaa Nasr El Din Mosbeh ⁽¹⁾, Hyam Refaat Tantawi ⁽²⁾,
Nashwa Said Mohamed Ali ⁽³⁾

(1) Professor of Pediatric Nursing, Faculty of Nursing, Ain Shams University

(2) Professor of Pediatric Nursing, Vice Dean for Community Service and Environmental Development,
Faculty of Nursing, Ain Shams University

(3) B.Sc., Nursing, (2009), Clinical Instructor at El-Doaa Nursing Institute

Abstract

Background: Pediatric nursing staff have an important role in administrating of penicillin and understanding the effect of penicillin allergy for pediatric patients. **Aim of the study:** This study aimed to assess the nurses' performance regarding penicillin administration for pediatric patients. **Research Design:** A descriptive design was used to this study. **Setting:** the study was conducted at General Outpatient clinics of Children's Hospital Affiliated to Ain Shams University Hospitals and Caridad Clinic. **Subjects:** A convenience sample was composed of 50 nurses working at the previously mentioned settings regardless their experience, age, gender, and qualification. Tools of data collection: (1) An interview questionnaire sheet to assess nurse knowledge about penicillin administration (2) Observational checklist to assess nurses practice toward penicillin administration. **Results:** The result found that half of the studied nurses their age were ranging between 20 years to less than 30 years old, with mean age 22.6 ± 1.3 , and more than half of studied nurses were females, while the minority of them had unsatisfactory level of knowledge regarding penicillin administration and most of them were incompetent for practices regarding penicillin administration. **Conclusion:** The study concluded that two thirds of the studied nurses had unsatisfactory total level of knowledge regarding penicillin administration, while more than half of them had incompetent total score of practices regarding penicillin administration, and there were a positive relation between nurses' knowledge and their practices toward penicillin administration with statistical significant difference. **Recommendation:** The study recommended that, periodic assessment for nurses performance regarding penicillin administration. Developing educational and orientation program for nurses about penicillin administration to improve their performance regarding penicillin administration. Further studies should be conducted in large sample size in different pediatric places to generalize information and improve nurses' knowledge and practice regarding penicillin administration.

Keywords: Nurses' Performance, Penicillin Administration, Pediatric Patients

Introduction

Penicillin, an antibacterial antibiotic known since ancient times, and is invented in certain ways from the fungus penicillium, was discovered by the scientist (Alexander Fleming) in (1928), and this discovery is considered a revolution in the history of medicine. It is also a deadly antibiotic for harmful and extraneous bacteria (*Henry and Norma, 2016*).

Penicillin antibiotics were among the first medications to be effective against many bacterial infections caused by staphylococci and streptococci. There are several enhanced penicillin families which are effective against additional

bacteria; these include the anti-staphylococcal penicillins, amino penicillins and the antipseudomonal penicillins (*Howard, et al., 2013*).

Penicillin derivatives vary depending on their chemical nature, the type of bacteria and how penicillin derivatives are used. Some types of penicillin are not affected by the acidity of the stomach is taken directly through the mouth and not fixed in the stomach because of its acid and is taken intramuscular or intravenous injection. Penicillin was one of the most effective antibiotics, but due to its overuse, bacteria developed from themselves during reproduction and today most bacteria have the

ability to resist penicillin (*Vallerand, et al., 2017*).

Penicillin allergies may be an over reported problem that can result in the use of less-appropriate and more expensive antibiotic treatments. Therefore, an accurate diagnosis is needed when penicillin allergy is suspected to ensure the best treatment options in the future (*Kemeny et al., 2017*).

The Nursing role during penicillin administration involves careful monitoring and assessing of pediatric patients condition because allergies occurs more frequently with penicillin than any other antibiotic. Nurses also should give the instructions to pediatric patients about the signs of allergic reaction including itching, rash and to immediately contact the health care provider (*Walling, 2015*).

Nurses have a responsibility to ensure that current best evidence and individual pediatric patient assessment informs their practice, so injections are given in the optimal site at the correct depth and rate of delivery with using the appropriate needle size and using an accurate land-marking technique (*Zagursky and Pichichero, 2014*).

Despite the widespread sensitivity of penicillin, As 5-10% of pediatric patients who used penicillin reported having an allergy to penicillin, studies have found that 85-90% of these pediatric patients do not really suffer from any allergic reaction to penicillin. This means that penicillin allergy is a problem that is not evaluated and diagnosed correctly, and it is incorrectly maximized by pediatric patients and medical staff, which causes depriving a large number of pediatric patients of the use of penicillin and its derivatives (*Vallerand et al ., 2017*).

Significance of thy study:

The nurse notes that penicillin allergy of pediatric patients regarding remains the most common drug allergy reported. Documentation or reporting of allergies often becomes inaccurate and many pediatric patients may report that they have an allergy to an antibiotic whereas pediatric patients may have in fact experienced effects such as fever and diarrhea. If a pediatric patient has exhibited signs of a true allergic reaction, re-exposure to penicillin or related antibiotics. It has

been estimated that up to 60% in Egypt of penicillin-allergic pediatric patients will experience another allergic event if given the drug again. With repeat penicillin use, those with an allergy were 11.2 times more likely than others to experience an allergic event (*Ulman, 2016*). In addition, nurses must be alert with respect to the use of various combination products which all contain penicillin.

So from the above facts, the researcher found that there is a need to assess the nursing performance for penicillin administration in pediatric care setting at Ain shams university in order to highlights about the important role of nursing staff in prevention the allergic reaction or complication from penicillin administration.

Aim of the Study

This study was aimed to assess the nurses' performance regarding penicillin administration for pediatric patients through the following:

- 1- Assess nurses' level of knowledge regarding penicillin administration for pediatric patients.
- 2- Assess nurses' practice regarding penicillin administration for pediatric patients.

Research questions:

- 1- What are the nurses' knowledge regarding penicillin administration for pediatric patients?
- 2- What are the nurses' practice regarding penicillin administration for pediatric patients?
- 3- Is there a relationship between knowledge and practice of nurses' regarding penicillin administration for pediatric patients?

Subjects and Methods

The subject and methods of the current study were discussed under the following four designs:

- I. Technical Design
- II. Operational Design
- III. Administrative Design
- IV. Statistical Design

I- Technical design

The technical design included research design, settings, subject and tools for data collection used in this study.

Research Design

A descriptive design was used to conduct this study.

Study Setting

The study was conducted at General Outpatient clinics of Children's Hospital Affiliated to Ain Shams University Hospitals and Caridac Clinic. General Outpatient clinic found in the old building at ground floor. Cardiac clinic found in the specialized clinics beside the old building at the second floor where pediatric patient was check for penicillin administration and sensitivity test of penicillin was done at nursing room.

Subjects

A convenience samples composed of 50 nurses who working at the previously mentioned settings regardless their experience, age, gender and qualification.

Tools of Data Collection

Data were collected through use of the following tools:

First tool: Interview Questionnaire sheet.

It was designed and developed by the researcher and written in a simple Arabic language based on scientific literature review in the form of closed ended questions and multiple choices. It covered the following parts.

Part I:

1. Characteristic of the studied nurses as their age, gender, marital status, qualification, years of experience, working area and previous training course about penicillin injection
2. Characteristic of the studied children as their gender, age, diagnosis, history of diseases.

Part II: It was used to assess nursing knowledge about Penicillin administration for pediatric patient. It consist of 22 opened and closed questions as (Nurses knowledge about penicillin include definition, indication, types, methods, side effects and forms of penicillin. Nurses knowledge about penicillin allergic

reaction as definition, causes, signs, precaution before, during, after administration, use wrist band in case of allergy. Prevention and Management of penicillin allergic reaction include sensitivity test before administration, treatment of penicillin allergic reaction, mixing penicillin with anther medication, handling missed dose of penicillin and management of anaphylactic shock).

Scoring system:

Each item of the total questionnaire sheet has been scored as: (1) =correct answer, (0) = incorrect answer. These scores were summed-up and converted into a percent score for total score: score < 75% referred to unsatisfactory knowledge, score 75% - 100% referred to satisfactory knowledge.

Second tool: Observational Check List :

It was adopted from (*Cydulka, 2014*) to assess nurse's practice regarding Penicillin administration for pediatric patients. It consist of 52 item and composed of four parts as follow: This section includes (1-9) about identify pediatric patient (10-22) about doing sensitivity test before injection (23-47) about steps to give intramuscular injection (48-52) about getting rid of penicillin injection.

Scoring system

Scoring was ranged from (0-1) related to all points the correctly done step was score one, and the step that not done or when done incorrectly was scored zero. These scores were summed-up and converted into a percent score for total score: score < 80% considered incompetent, score 80 - 100% considered competent.

II. Operational Design:

The operational design for this study consisted of three phases, preparatory phase, pilot study and fieldwork.

Preparatory Phase

A review of current and past, local and international related literature on various aspects related to penicillin administration using textbooks, articles, periodical magazines was done to get acquainted for penicillin administration and also to develop the study tools.

Face and Content Validity

To achieve the criteria of trust-worthiness of the tool of data collection in the study, the tools were tested and evaluated for their face and content validity, by a jury group consists of three experts, from pediatric nursing department at faculty of Ain Shams University to ascertain relevance, clarity, and completeness of the tool.

Tool Reliability

The reliability of the questionnaire sheet was assessed through measuring their internal consisted by Cronbach's Alpha coefficient test and its value was 0.89.

Pilot Study

A pilot study was carried out in the first half of July, 2016, before data collection. The pilot study included 10% (5) of nurses working at the previously mentioned setting. The purpose of the pilot study was to test applicability, clarity, relevance, feasibility of study tool and sequence of questions to maintain consistency. There is no modification were done. The nurses and pediatric patients in the pilot study were included in the subjects of the study.

Fieldwork

Data were collected over 6month period from beginning of November 2017 to end of April 2018. The field work has been performed in the following sequence: The researcher visited the selected outpatient from 9.00 a.m. to 1.00 p.m. for 3 days per week (Sunday, Monday and Thursday) at morning shift to collect and implement the study. The researcher introducing herself for studied nurses, then gave a brief idea about the study and its aim. Data was collected through individualized interview with each nurse. Questionnaire sheets were completed by the nurses and the average time needed was around (15-20 minutes). The researcher observe the nurses during penicillin administration and filled the observational checklist within (40 minutes). Data was collected through individualized interview with each nurse by clarifications needed for children were done by the researcher. Take into consideration using simple and clear Arabic language.

Ethical Consideration

Research Approval of the study protocol was obtained from Scientific Ethical Research

Committee to conduct this study. Permission to carry out the study from responsible authorities in the Faculty of Nursing at Ain Shams University after explanation of purpose of the study was obtained. An interview conducted with study nurses, of the previous mentioned settings to inform them about the purpose of the study and request their assistance to facilitate the work. The researcher explained the study aim in a simple and clear manner to be understood by eligible nurses. Verbal approval was obtained from the studied nurses before collecting any data.

III. Administrative Design

An official permission to conduct the study was obtained from the Dean of Faculty of Nursing Ain Shams University to the directors of inpatients and outpatients department of children's hospitals of Ain Shams University requesting their approval for conducting this study.

IV. Statistical Design

Data collected from the studied sample was revised, coded and entered using PC. Computerized data entry and statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 20. Data were presented using descriptive statistics in the form of frequencies, percentages. Chi-square test(χ^2) was used for comparisons between qualitative variables. Probability (P- value): P-value $0 \leq .05$ was considered significant, P-value ≤ 0.001 was considered as highly significant, P-value >0.05 was considered insignificant.

Results

Part (I): Demographic Characteristics of the Studied Nurses

Table 1: Number and percentage distribution of studied nurses according to their demographic characteristics (no =50)

Items	No	%
Age in years		
<20	15	30.0
20 < 30	25	50.0
30 ≤ 40	10	20.0
Mean ±SD		22.6±1.3
Gender		
Male	18	36.0
Female	32	64.0
Marital Status		
Signale	10	20.0
Married	27	54.0
Divorced	13	26.0
Qualification		
- Bachelor	10	20.0
- Technical institute	27	54.0
- Diploma nurse	13	26.0
Years of experience		
1 < 5	19	38.0
5 < 10	23	46.0
10 ≤ 20	8	16.0
Mean ±SD		7.2±1.6
Working area		
- Outpatient clinics	18	36.0
- Cardiac clinics	32	64.0

Table (1) showed that, 50% of the studied nurses their age were ranging between 20 years and 30 years old, with mean age 22.6±1.3 years. And 64% of them were females and more than half (54%) of them were married and had technical institute education. Also almost half (46%) of studied nurses had 5<10 years of experience, while two thirds of studied nurses (64%) work at outpatient clinics.

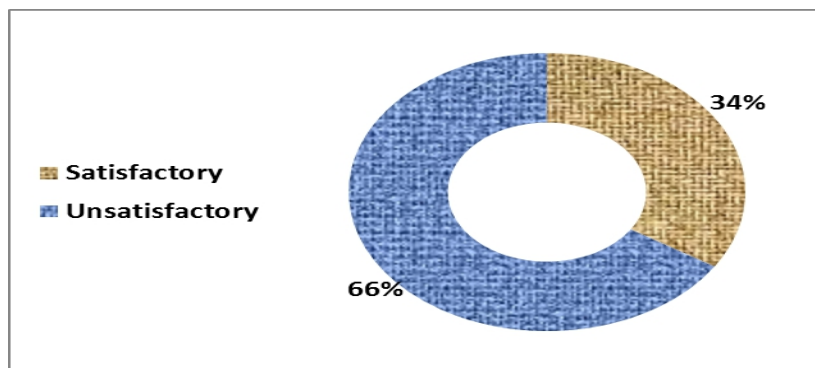
Part (II): Characteristics and Medical History of the Studied Children

Table 2: Number and percentage distribution of studied children according to their characteristic (no =50)

Items	No	%
Age in years		
3<6	9	18.0
6 <12	17	34.0
12 ≤ 18	24	48.0
Mean ±SD	(10.2±0.6)	
Gender		
Male	19	38.0
Female	32	62.0
Diagnosis		
Tonsillitis	10	20.0
Rhumatic fever	27	54.0
Arthritis	13	26.0
Duration of illness in years		
1<3	19	38.0
3<6	5	10.0
6<9	22	44.0
9≤12	4	8.8
Mean ±SD	7.3±0.9	
Heredity disease of penicillin allergy		
Yes	19	38.0
No	23	46.0
Family history of penicillin allergy		
Yes	9	18.0
No	41	82.0
Duration of penicillin treatment		
1<3 years	19	38.0
3<6 years	5	10.0
6<9 years	22	44.0
9≤12years	4	8.8
Mean ±SD	7.3±0.9	

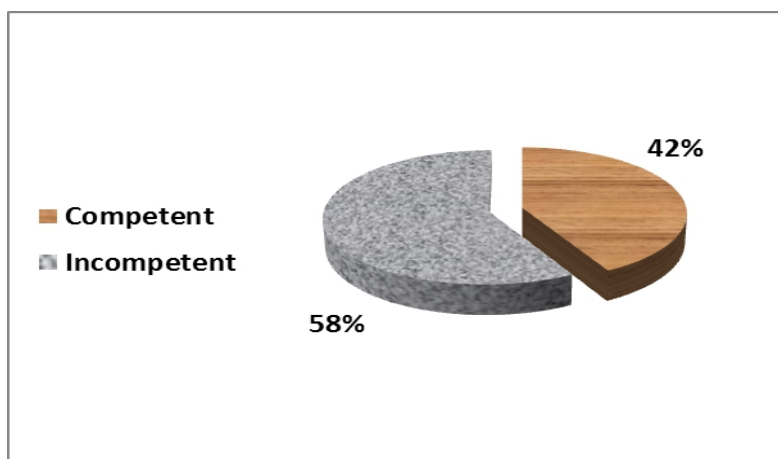
Table (2) showed that 62% of the studied children were males with mean age 10.2±0.6 years, and more than half (54%) of the studied children had rheumatic fever. In relation to duration of illness this table revealed that, nearly half (44%) of them had illness for 6<9 years with mean± SD 7.3±0.9 years. In addition (86%) of the studied children had heredity diseases of penicillin reaction and (82%) of them had family history of penicillin reaction. In relation to duration of penicillin treatment this table reveals that, 44% of them were received the penicillin for 6-9 years with mean± SD 7.3±0.9 years.

Figure 1: Percentage of the studied nurses according to their total knowledge toward penicillin administration (no =50)



This figure illustrated that 66% of studied nurses had unsatisfactory level of knowledge regarding penicillin administration.

Figure 2: Percentage of the studied nurses according to their total practices toward penicillin administration (no =50)



Regarding studied nurses total practices, this figure illustrated that more than half (58%) of them were incompetent regarding penicillin administration.

Part (V): Relation between The studied variables.

Table 3: Relation between socio demographic characteristic of the studied nurse and their knowledge toward penicillin administration

Items	Satisfactory		Unsatisfactory		X ²	P Value
	No	%	No	%		
Age in years						
<20	3	6.0	12	24.0	11.84	0.003
20 < 30	6	12.0	19	38.0		
30 < 40	8	16.9	2	4.0		
Gender						
Male	2	4.0	16	32.0	6.6	0.01
Female	15	30.0	17	34.0		
Marital Status						
Single	3	6.0	12	24.0	11.8	0.003
Married	6	12.0	19	38.0		
Divorced	8	16.9	2	4.0		
Qualification						
Bachelor	8	16.0	2	4.0	11.84	0.003
Technical institute	6	12.0	21	42.0		
Diploma nurse	3	6.0	10	20.0		
Years of experience						
1 < 5	3	6.0	16	32.0	6.5	0.04
5 < 10	12	24.0	11	22.0		
10 < 20	2	4.0	6	12.0		
Working area						
Outpatient clinics	2	4.0	16	32.0	6.6	0.01
Cardiac clinics	15	30.0	17	34.0		

P-value > 0.05 NS, *P-value ≤ 0.05 S, **P-value ≤ 0.001 HS

Table (3) illustrated that, there was high statistical significant difference between age of the studied nurse and their knowledge regarding to penicillin administration at (p<0.01). While, there was statistical significant difference between gender of the studied nurse and their knowledge regarding to penicillin administration at (p<0.05) and there was high statistical significant difference between marital status and qualification of the studied nurse and their knowledge regarding to penicillin administration at (p<0.01). while, there was statistical significant difference between

years of experience and working area of the studied nurse and their knowledge regarding to penicillin administration at ($p < 0.05$).

Table 4: Relation between socio demographic characteristic of the studied nurse and their practice toward penicillin administration

Items	Competent		Incompetent		X ²	P Value
	No	%	No	%		
Age in years						
<20	5	10.0	10	20.0	11.9	0.002
20 < 30	7	14.0	18	36.0		
30 < 40	9	18.9	1	2.0		
Gender					0.11	0.73
Male	7	14.0	11	22.0		
Female	14	28.0	18	36.0		
Marital Status					11.9	0.002
Single	9	18.9	1	2.0		
Married	7	14.0	18	36.0		
Divorced	5	10.0	10	20.0		
Qualification					8.12	0.02
Bachelor	8	16.0	2	4.0		
Technical institute	10	20.0	17	34.0		
Diploma nurse	3	6.0	10	20.0		
Years of experience					13.02	0.001
1 < 5	2	4.0	17	34.0		
5 < 10	15	30.0	8	16.0		
10 < 20	4	4.0	4	8.0		
Working area					0.11	0.73
Outpatient clinics	7	14.0	11	22.0		
Cardiac clinic	14	28.0	18	36.0		

P-value > 0.05 NS, *P-value ≤ 0.05 S, **P-value ≤ 0.001 HS

Table (4) illustrated that, there was high statistical significant difference between age of the studied nurse and their practice regarding to penicillin administration at ($p < 0.01$). While, there was no statistical significant difference between gender of the studied nurse and their practice regarding to penicillin administration at ($p > 0.05$) and there was statistical significant difference between marital status and qualification of the studied nurse and their practice regarding to penicillin administration at ($p < 0.05$). While, there was high statistical significant difference between years of experience and working area of the studied nurse and their practice regarding to penicillin administration at ($p < 0.01$).

Table 5: Correlation between nurses’ knowledge in relation to their practices toward penicillin administration

Item	Practices	
	r	P Value
Knowledge	0.78	*0.03

**p-value ≤ 0.001 HS

Table (5) illustrated positive correlation between nurses’ knowledge in relation to their practices about penicillin administration with statistical significant difference between nurses’ knowledge in relation to their practices about penicillin administration at ($P < 0.05$).

Discussion

Penicillin is widely used antibiotics for various types of infections commonly for pediatric patients depend on their diagnosis. Nurses play a major role in management and prevention of allergy caused by penicillin.

There is little know information about penicillin administration and prevention in Egypt (*Edward et al., 2017*).

The aim of this study was to assess the nurses’ performance regarding penicillin administration for pediatric patients, through

assessing nurses' level of knowledge and practice regarding penicillin injection administration.

Concerning the demographic characteristic of the studied sample, the results of the present study revealed that half of nurses' age were between (20-30) years old and the mean age of the studied nurses was (22.6±1.3). This may be due to the most of those nurses were newly graduated. This finding was in agreement with a study done by *Mohan, (2015)* about 'Assessment of knowledge for nurses and management of allergy to penicillin's ' and found that about more than half of the studied samples were aged from 20 to 30 years old.

On the other hand, this finding was incongruent with a study done by *Torres and Blance (2012)* who studying "Nurses' performance regarding caring of children with hypersensitivity " and found that the mean age of the study nurses were 48.7 years old.

As regard to gender of the studied nurses, the results of the present study revealed that, two third of the studied nurses were females. This finding could be interpreted in the light of the fact that majority of nurses in Egypt are females and their number are still greater than males in nursing fields till ten years ago. This finding was incongruent with a study done by, *Macy and Poon (2014)* about "Quality of nursing care for pediatric patients with allergy incidence" and found that, two thirds of the studied nurse were male.

Concerning the educational level, the results of the present study revealed that, more than half of the studied nurses were graduated from technical institute of nursing, this explain lack of knowledge and practice regarding penicillin injection. This was in agreement with a study done by *Phillip et al., (2013)* about "On a guideline model for nurse's caring with children undergoing penicillin" and found that more than half of nurses were graduated from technical institute.

The previous findings are incongruent with *Abdel Zahar, (2015)* who study the "Nurses' practice with physician collaboration during management of pediatric patients, side-reactions with particular valvulites" and found

that more than half of the studied nurses had Bachelor degree in nursing.

Regarding years of experience, the results of the present study showed that, almost half of studied nurses had 5-10 years of experience. This result may explain that young nurses are occupied on pediatric care units to acquire experience. This finding was congruent with a study done by *Martin and Adolfsson, (2016)* about 'Nurses' practice toward family importance in infective endocarditis' and found that, more than half of nurses had experience more than 5 years.

Considering attendance of training course about penicillin injection administration, the finding of the present study revealed that, more than three quarters of the studied nurses did not attend training course regarding penicillin injection administration. From the researcher point lack of training program may be due to lack of their awareness about the importance of priority of nursing intervention and expected complication. Also this may be due to lack of in service training courses in working sites Increase work over load could lead to lack of time for nurses to participate on any training courses.

In a similar study done by *Holm and Mosbech (2011)* about " Nurses performance management and prevention for pediatric patients undergoing penicillin", and found that the majority of nurses in the study had no training course. On the other hand, this finding was incongruent with a study done by *Werner and Holden (2015)* about 'Interpretation skills among pediatric nurses " and found that more than two third of the studied nurses attend training course regarding penicillin administration.

This study was highly supported by a study done by *Boyle et al., (2015)* about " Improving adjustment patterns among children with tonsillitis " and reported two thirds of the study children were male and half of them their age between 12-17 years old.

Regarding to the medical history of the studied children, this study revealed that, more than half of the studied children had rheumatic fever. Nearly half of them their duration of illness were 6-9 years, and all of the studied children did

not had heredity diseases or family history for rheumatic fever. In relation to duration of penicillin treatment this study revealed that, nearly half of the studied children were received penicillin for 6-9 years.

This finding was incongruent with a study done by *Tantaw et al ., (2014)* about "Risk factors associated with rheumatic fever among children" and reported that nearly three quarters of the studied children had rheumatic fever and half of them had heredity disease related to rheumatic fever.

Regarding to studied nurses for their total knowledge about penicillin injection administration, this study revealed that two thirds of the study nurses had unsatisfactory level of knowledge regarding penicillin administration.

Also, some factors were observed by the researcher during implementing this study that may explain unsatisfactory nurses knowledge. Including the lack of resources, lack of internal educational services programs and training courses, low level of qualification of studied nurses because of a majority of them have technical institute.

Concerning to studied nurses for their total practices about penicillin injection administration, this study revealed that more than half of the studied nurses were incompetent regarding penicillin injection administration. This might be due to nursing staff were not attend training course bout penicillin injection, also nursing staff should participate in workshops within the hospital about preparation for penicillin injection.

As regard to relation between **nurses' demographic characteristic and their knowledge regarding penicillin administration for pediatric patients**, the present study revealed that, there was highly statistical significant between age, marital status, and qualification and attending course of the studied nurses and their knowledge regarding penicillin administration. While, there was statistical significant difference between gender, years of experience and working area of the studied nurses and their knowledge regarding penicillin administration ($P<0.01$). This study was supported by a study done by *Brasaité et al., (2016)* who clarified that, age and qualification of the studied nurses had highly

significant relation with their knowledge regarding penicillin injection administration.

This finding was incongruent with as study done by *Abas and Mohammed, (2013)* who studied "Effectiveness of continuing nursing education program on nursing staff knowledge at pediatric units" and found that there was a non-significant relation between nurses' knowledge related to penicillin injection administration.

Concerning to relation between nurses' practice and their demographic characteristic data. The current study revealed that, there was high statistical significant relation between the nurses' practice and age, marital status and years of experience. Also, the study revealed that, there was statistical significant relation between qualification and attending training courses of the studied nurses and their practice regarding penicillin administration. While, there was no statistical significant between gender of the studied nurses and their practice regarding penicillin injection administration.

This finding is similar to a study done by *Pederson and Bjergaad (2012)* whose study entitled "Assessment of nurses' performance for pediatric patients with tonsillitis" and found that, there was no statistical significant between gender of the studied nurses and their practice. This result disagreed with *Sayed et al ., (2012)* who studied "Assessment of nurses' performance caring of children with arthritis" and found that, there was no statistically significant relation between nurses' practice and years of experience.

The current study revealed that, there was positive correlation between nurses' knowledge in relation to their practice about penicillin injection administration with statistical significant. This finding was supported by a study done by *Malk and Taha, (2013)* about "Assessment of nurses" knowledge and practice among children with rheumatic fever " and found that, there was positive correlation between nurses' knowledge in relation to their practice with high statistical significant. These results was incongruent a study done by *Kamal and Meanawi , (2015)* who found that, there was no statistically significant relation between total nurses' knowledge and total nurses' practice.

Conclusion

In the light of the study findings, the results showed that, two third of the studied nurses had unsatisfactory total level of knowledge regarding penicillin administration. Also, more than half of studied nurses had incompetent total score of practices regarding penicillin administration. In addition to, there was a positive relation between nurses' knowledge in relation to their practices about penicillin injection administration.

Recommendations

Based on the findings of the present study the following recommendations were formulated:

1. Periodic assessment for nurses performance regarding penicillin administration.
2. Developing educational and orientation program for nurses about penicillin administration to improve their performance regarding penicillin administration.
3. Further studies should be conducted in large sample size in different pediatric places to generalize information and improve nurses' knowledge and practice regarding penicillin administration.

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