

## Rapid Communication

# Assessment of the Nurses' Skills during Caring for Hemodialysis Patients

Essa Alramadhan S<sup>1\*</sup>, Alsayed S<sup>2</sup>, Ayesh Alshalawi A<sup>3</sup>, Abdullah Alanazi A<sup>4</sup>, Sajdi Alotiby A<sup>5</sup>, Mohammad Abdullah Alshehri A<sup>6</sup>, Essa Ageeli R<sup>7</sup>, Qassem Essa Sabey A<sup>8</sup>, Mohammed Matashish F<sup>9</sup> and Saeed Almadhi A<sup>10</sup>

<sup>1</sup>Master in Adult Medical Surgical Nursing, Assistant Director of Nursing in King Salman Hospital, Saudi Arabia

<sup>2</sup>Department of Medical Surgical, King Saud University, Saudi Arabia

<sup>3</sup>Master in Pediatric Nursing Assistant, Director of Nursing in Pediatric Hospital, Saudi Arabia

<sup>4</sup>Diploma in Renal Dialysis, Staff Nurse in Alyamamah Hospital, Saudi Arabia

<sup>5</sup>Diploma in General Nursing, Assistant Director of Nursing in King Salman Hospital, Saudi Arabia

<sup>6</sup>Bachelor in General Nursing, Nurse Specialist in (Wound Management Unit) King Salman Hospital, Saudi Arabia

<sup>7</sup>Master of Advanced Nursing, Head Nurse of Surgical Ward in King Salman Hospital, Saudi Arabia

<sup>8</sup>Master in Nursing Education, Nursing Educator in King Salman Hospital, Saudi Arabia

<sup>9</sup>Master in Nursing Education, Nursing Educator in King Salman Hospital, Saudi Arabia

<sup>10</sup>Diploma in General Nursing, Staff Nurse in Primary Health Center, Saudi Arabia

\*Corresponding author: Sahar Essa Alramadhan, Master in Adult Medical Surgical Nursing, Nursing in King Salman Hospital, Saudi Arabia

Received: July 12, 2019; Accepted: September 28, 2019; Published: October 05, 2019

## Introduction

Chronic Renal Failure (CRF) is an irreversible and progressive kidney failure [1].

Dialysis is a treatment used for people whose kidneys don't work properly. It's a common treatment that has been used for people with kidney problems since the 1740s. When the kidneys don't perform these functions due to disease or injury, dialysis can help purify the blood and remove waste. There are two types of dialysis: hemodialysis and peritoneal dialysis [2].

Hemodialysis (HD) is a complex procedure for the patient which takes place in hospitals or dialysis centers, mainly three times a week, thus implying substantial changes in the normal routine of patients' everyday lives [3], where hemodialysis has been proved to be the most effective treatment modality, as it results in long survival rates and maintains patients' life at a satisfactory level [4].

It is the most common method used to treat advanced and permanent kidney failure. Since the 1760s, when hemodialysis first became a practical treatment for kidney failure, we have learned much about how to make hemodialysis treatments more effective

## Abstract

Hemodialysis is a method that is used to achieve the extracorporeal removal of waste products such as creatinine and urea free water from the blood when the kidneys are in a state of renal failure. The Arab countries have a high prevalence of chronic kidney disease, risk factors e.g. diabetes, obesity and hypertension. Diabetes and hypertension are the top two causes of End Stage Renal Disease (ESRD) in seven of twelve Arab countries. The nurse in the dialysis unit has an important role in monitoring, supporting, assessing and educating the patient. The standards of nephrology nursing practice are authoritative statements of the duties that all nephrology registered nurses are expected to perform competently. This study aims to identify nurse's level of knowledge caring patient undergoing hemodialysis, to identify factors that affecting nurses level of knowledge caring patient undergoing hemodialysis.

**Methodology:** It is an exploratory quantitative study, and convenient type of sample. It is conducted in AKU (Artificial Kidney Unit) in King Saud Medical City (KSMC). The sample was all nurses working in the unit, multi-nationality the study sample were 97 nurses.

**Data were Collected Through:** Questionnaire for assessing the nurses socio- demographic and assessing the nurse's level of skills.

**Results:** There is a correlation between the nurse's level of skills and their performance and there is low level of nurse's skills, as regards to caring the patient undergoing hemodialysis.

**Recommendation:** The decision-makers in the hospitals should encourage and motivate nurses to attend training programs/course related to hemodialysis.

**Keywords:** Nurses; Skills; Hemodialysis

and minimize side effects. However, even with better procedures and equipment, hemodialysis is still a complicated and inconvenient therapy that requires a coordinated effort from your whole health care team, including your nephrologist, dialysis nurse, dialysis technician, dietitian, and social worker [5].

As regard to hemodialysis history. The first dialysis session in Saudi Arabia took place in 1791 and the first renal transplant in 1797. By the end of 2002, there were 102203 patients on hemodialysis, 766 on peritoneal dialysis, and 9236 with functioning kidney grafts. Of the 102203 patients on hemodialysis in the Kingdom, the Ministry of Health (MOH) hospitals, 19.96 by non-MOH governmental hospitals, and 16.46 treated 65.76 from the private sector. Of all the patients receiving dialysis, only 2.96 were on Peritoneal Dialysis (PD). Of these, two-thirds are on automatic Peritoneal Dialysis (APD) and one-third on Continuous Ambulatory Peritoneal Dialysis (CAPD). The mortality rate among patients on PD is similar to those on hemodialysis. Approximately 54.26 were males and 22.36 were Saudis of all the patients on dialysis, 66.26 were over >45 years of age. Of the current patients on hemodialysis, 42.56 were diabetic. The prevalence of Renal Replacement Therapy (RRT) has increased from 361 Per Million Population (PMP) in 1775 to 294 PMP in 2002. Over

the same period, the dialysis patient prevalence has increased from 129 to 463 PMP (an increase of 1626) and renal transplant prevalence from 162 to 391 PMP (an increase of 1216) [6].

Complications of hemodialysis can be broadly divided into two categories, complications during a hemodialysis session and complications of long-term hemodialysis with problems occurring during a dialysis session. They can be classified into common problems and uncommon serious complications [7].

As regard to role of the nurse in the hemodialysis unit. The nurse in the dialysis unit has an important role in monitoring, supporting, assessing and educating the patient. During dialysis, the patient, the dialyzer, and the dialysate bath require constant monitoring because numerous complication are possible, including clotting of the circuit, air embolism, inadequate or excessive ultrafiltration hypotension, cramping, vomiting, blood leaks, contamination, and access complications [8].

Dialysis nurses must have sophisticated technical skills that required in all types of dialysis not only to operate the complex machinery, but also to work with the many types of intravenous lines required. Dialysis nurses must have a keen attention to detail, as administering dialysis requires strict adherence to protocols. Dialysis nurses also need strong motivational and educational skills, as they teach patients of all ages and backgrounds about their disease and motivate patients to take care of themselves [9].

In addition, quality nurses is constantly delighting a patient by providing effective and efficient healthcare services accordingly the most up-to-date clinical guidelines and standards, which meet the patient needs and satisfy providers. As a result, healthcare services should have the capacity to meet the expectations of both the patient and the healthcare provider [10].

According to the American Nurses Association (ANA, 2010) standards of care signify the first step of any quality improvement program as they give expert -level benchmark to appraise nursing care.

### Aim of the Study

This study aims to assess nurses skills caring patient undergoing hemodialysis and to Identify factors that affecting nurses skill caring patient undergoing hemodialysis.

### Methods

The duration of data collection was started February 15/02/2016 to March 24/03/2016. The assessment and data collection was done through observation checklist and test application under my direct supervision from 9am up to 4pm for 6 days per week from Saturday to Thursday. Participants were selected according to their inclusion criteria and availability in the same area. Each participant was observed in doing the procedure twice, once for cannulation procedure and once for dressing procedure.

The study sample was (79) nurse from multi nationality.

The total number of the nurses is 152. According to exclusion and inclusion criteria, 79 was selected, this sample included all dialysis nurses according to the following criteria:

**Table 1:** Distribution of Socio-demographic characteristics.

Items	Frequency	%
<b>Sex</b>		
Male	78	98.7
Female	1	1.3
<b>Age by year</b>		
20-29	41	48.1
30-39	34	43
40≥	7	8.9
Mean±SD	30.3±4.8	
<b>Marital status</b>		
Single	26	32.9
Married	50	63.3
Divorced	3	3.8
<b>Nationality</b>		
Saudi	32	40.5
Non-Saudi	47	59.5

**Inclusion criteria:** Nurses from both sex, multi nationality and had at least 6 months training in hemodialysis units.

**Exclusion criteria:** Nurses, who are not providing direct care to the patient, e.g. head nurse/charge nurse/supervisors/infection control nurse.

#### The data collected through the following tools:

1. Questionnaire for assessing the nurses’ Socio-demographic characteristics, educational and experience background, all information needed was collected throughout direct interview with nurses.

2. Observation checklist for assessing the nurses’ skills:

Which applied through direct and indirect observation, performed skills for patient pre, during, and post the hem dialysis session.

#### Ethical consideration

Ethical codes of conduct are to be strictly adhered to all stages of the project, all information which was taken from participants in the study remained strictly anonymity and confidential.

#### Statistical methods

##### The following statistical methods used:

1. Frequencies and percentage for the description of study sample demographic characteristics.

2- The scale for observation checklist as the following

From 90-100 % ---exceptional level

80-89 % --Above average

70-9 % --Satisfactory

60-69 % --Unsatisfactory

3. Chi-square test were used to assess the association between

**Table 2:** Percentage distribution of the dialysis nurses' qualification and years of experiences.

Item	No	%	P value
<b>Qualification</b>			
· Nursing Diploma in dialysis	44	56	0.409
· General nursing diploma	24	30	
· Bachelor science in nursing	11	14	
<b>Years of experiences as a hemodialysis nurse</b>			
· ≤ 5	48	60.8	0.059
· 6-7	23	29.1	
· ≥ 10	8	10.1	
<b>Attending training programs/course as regard to hemodialysis</b>			
· No	74	93.7	0
· Yes	5	6.3	

**Table 3:** The nurses' skills for performing nursing Standard policy & procedure for patient undergoing hemodialysis process.

Skills	Unsatisfactory	Satisfactory	Above Average	Exceptional level n (%)
	n (%)	n (%)	n (%)	
Pre Dialysis	(2.5) 2	25(32.6%)	52(65.8%)	0
Initiating Dialysis	71(89.9%)	7 (8.9%)	1(1.3%)	0
During Dialysis	79(100%)	0	0	0
Post Dialysis	52(65.8%)	10(12.7%)	17(21.5%)	0

the factors affecting nurse's skills, where the significant level of acceptance for the test is 0.05 is less than 0.05 then we find there is a significant association.

4. Person Correlation to assess the relationship between the variables, where the correlation Value is between -1 and 1, if it's near 1 then it's highlight positive correlated and if it's -1.

Then it is highly negatively correlated. In addition, the significant level of acceptance for the test is 0.05, so if the P-value is less than 0.05 then we find there is a significant association.

## Results

Table 1 shows that, the study sample comprised (79) nurses, (78) male and (1) female.

Approximately half of the nurse's ages are between 20-29 years (48.1) and the mean score and standard deviation is 30.3 ± 4.2 for nurse's age. Two third of the nurses are married 63.3%, and near to two third of the nurses are non-Saudi 59.5%.

Table 2 shows that more than (56%) have nursing diploma in dialysis, less than one-third, (30%) have general nursing diploma, and 14.8% have bachelor science in nursing P 0.409 years of experiences as a hemodialysis nurse, near to the two thirds of the nurses (60.8%) less than 5 years and less than one third (29.1%) there experience between 6-9 year and those who have 10 years' experience there represent 10.1%.

The majority of the nurses (93.7%) were attending training programs/course hem dialysis while only (6.3%) not attended training program Table 3 shows half of the nurses in pre dialysis

**Table 4:** Percentage distribution the observed nurses' skill of nursing standard & policy procedure for patient undergoing hemodialysis.

Nursing Standard policy & Procedure	Nurses Level of skills							
	n=79(%)							
	Unsatisfactory		Satisfactory		Above Average		Exceptional level	
	n	%	n	%	n	%	N	%
Dialysis laboratory work in dialysis unit	0	0	8	10.4	15	19.5	56	72.7
Dual lumen catheter dressing change(temporary vascular access	2	3	23	34.9	39	59.1	13	19.7
Management of Anticoagulation	1	1.5	8	12.3	4	6.1	52	80
Management of patient with aneurysms	17	47.2	12	33.3	6	17.7	1	2.8
Transporting patients for dialysis from the nursing unit	0	0	0	0	0	0	8	100
Management of patient with disequilibrium syndrome	0	0	0	0	0	0	6	100
Care of AV fistula AV/graft	0	0	0	0	2	70	1	30
Fistula arm exercise	0	0	0	0	1	30	2	70

(65.8%) have above average level and third (32.6%) have satisfactory, while no anyone have an exceptional level of skill, and only (2.5) have unsatisfactory level in initiating dialysis stage shows that less most of the nurses (89.9%) unsatisfactory level of skills while ((8.9%) have satisfactory level and above average (1.3%) and no anyone have exceptional level of skills during dialysis (100%) have unsatisfactory level of skills in post dialysis all the respondents tow fifth have unsatisfactory of the skills (65.8%) and (21.5%) have Above Average of skills and (12.7%) have satisfactory level of skills no anyone have exceptional level of skills.

Table 4 regard skills about Dialysis laboratory work in dialysis unit (10.4%) have a satisfactory level of the skills and (19.5%) have above level of the skills and (72.7%) an exceptional level of performance the half of nurses (59.1%) has above average skills regard Dual lumen catheter dressing change and (34.9%) have satisfactory level while (19.7%) have exceptional level of performance, regard Transporting patients for dialysis from the nursing unit and Management of patient with disequilibrium syndrome (100%) have an exceptional level of performance. (70%) have above average skill regard caring of fistula while only (30%) do fistula arm exercise.

Table 5 show relation between skills performance and age in (pre-initiation -during and post) are **-0.185, -0.0265, -0.001, 0.000 respectively.**

In Table 6 shows the relationship between nurse's marital status and the nurses' level of skills in (pre-initiation -during and post) are **-0.244\*-0.025, 0.000, -0.034 respectively.**

Table 7 shows the relationship between years of experience and the nurses' level of skills are **-0.166, -0.76, 0.000, -0.108 respectively.**

Table 8 shows the relationship between nurse's nurses' nationality and the nurses' level of skills **-0.085, 0.119, 0.000, -0.162 respectively.**

**Table 5:** Relationship between “nurses’ age and the nurses’ total skills.

Nursing Standard Policy & Procedure	Skills			P value
	20-29 38	30-39 34	40≥ 7	
<b>Pre</b>				
Unsatisfactory 60-67%	0	0	2(28.6)	-0.185
Satisfactory 70-79%	11(39)	12(35.3)	2(28.6)	
Above average 80-89%	27(71.0)	22(64.7)	3(43.9)	
Exceptional level 90-100%	0	0	0	
<b>Initiating</b>				
Unsatisfactory 60-67%	3(89.5)	32(94.1)	5(71.4)	-265
Satisfactory 70-79%	4(10.5)	1(2.9)	2(28.6)	
Above average 80-89%	0	1(2.9)	0	
Exceptional level 90-100%	0	0	0	
<b>During</b>				
Unsatisfactory 60-67%	38(100)	34(100)	7(100)	-0.001
Satisfactory	0	0	0	
Above average 80-89%	0	0	0	
Exceptional level 90-100%	0	0	0	
<b>Post</b>				
Unsatisfactory 60-67%	24(63.1)	21(61.8)	7(100)	0
Satisfactory 70-79%	3(7.9)	7(20.6)	0	
Above average 80-89%	11(29.0)	6(17.6)	0	
Exceptional level 90-100%	0	0	0	

**Table 6:** The relationship between “nurses’ marital status” and the nurses’ total skills.

Nursing Standard Policy & Procedure	Skills			P value
	Single 26	Married 50	Divorced 3	
<b>Pre</b>				
Unsatisfactory 60-67%	0	1(2.0)	1(33.3)	-0.244*
Satisfactory 70-79%	7(26.9)	16(32.0)	2(66.7)	
Above average 80-89%	19(73.0)	33(66.0)	0	
Exceptional level 90-100%	0	0	0	
<b>Initiating</b>				
Unsatisfactory 60-67%	23(88.5)	45(90.0)	3(100)	-0.025
Satisfactory 70-79%	3(11.5)	4(8.0)	0	
Above average 80-89%	0	1(2.0)	0	
Exceptional level 90-100%	0	0	0	
<b>During</b>				
Unsatisfactory 60-67%	26(100)	(100)50	3(100)	0
Satisfactory 70-79%	0	0	0	
Above average 80-89%	0	0	0	
Exceptional level 90-100%	0	0	0	
<b>Post</b>				
Unsatisfactory 60-67%	17(65.4)	33(66.0)	2(66.7)	-0.034
Satisfactory 70-79%	3(11.5)	4(8.0)	0	
Above average 80-89%	0	1(2.0)	0	
Exceptional level 90-100%	0	0	0	

Table 9 Relationship between “nurses attended training programs/course” and the nurses’ total level of skills are **-0.016, 0.063, 0.000, -0.05 respectively.**

### Discussion

The dialysis nurse is responsible for all types or Renal Replacement Therapy (RRT), including hemodialysis, and continuous renal

**Table 7:** Relationship between “nurses’ years of experience and the nurses’ total level of skills.

Nursing Standard Policy & Procedure	Skills			P-Value
	<5 no 48	6-7 no.23	>10 no.8	
<b>Pre</b>				
Unsatisfactory 60-67%	0	1(4.4)	1(12.5)	-0.166
Satisfactory 70-79%	15(31.3)	7(30.5)	3(37.5)	
Above average 80-89%	33(68.8)	15(65.2)	4(50.0)	
Exceptional level 90-100%	0	0	0	
<b>Initiating</b>				
Unsatisfactory 60-67%	42(87.5)	22(95.7)	7(87.5)	-0.76
Satisfactory 70-79%	5(10.4)	1(4.4)	1(12.5)	
Above average 80-89%	1(1.1)	0	0	
Exceptional level 90-100%	0	0	0	
<b>During</b>				
Unsatisfactory 60-67%	0	0	0	0
Satisfactory 70-79%	0	0	0	
Above average 80-89%	0	0	0	
Exceptional level 90-100%	0	0	0	
<b>Post</b>				
Unsatisfactory 60-67%	30(62.5)	16(69.6)	6(75.0)	-0.108
Satisfactory 70-79%	6(12.5)	3(13.1)	1(12.5)	
Above average 80-89%	12(25.0)	4(17.4)	1(12.5)	
Exceptional level 90-100%	0	0	0	

**Table 8:** The relationship between “nurses’ nationality” and the nurses’ total level of skills.

Nursing Standard Policy & Procedure	Skills		P value
	Saudi 32	Non-Saudi 47	
<b>Pre</b>			
Unsatisfactory 60-67%	0	2(42.6)	-0.085
Satisfactory 70-79%	10(31.3)	15(31.9)	
Above average 80-89%	22(68.8)	30(63.8)	
Exceptional level 90-100%	0	0	
<b>Initiating</b>			
Unsatisfactory 60-67%	30(63.8)	41(87.2)	0.119
Satisfactory 70-79%	2(6.3)	5(10.6)	
Above average 80-89%	0	1(2.1)	
Exceptional level 90-100%	0	0	
<b>During</b>			
Unsatisfactory 60-67%	32(100)	47(100)	0
Satisfactory 70-79%	0	0	
Above average 80-89%	0	0	
Exceptional level 90-100%	0	0	
<b>Post</b>			
Unsatisfactory 60-67%	20(62.5)	32(68.1)	-0.162
Satisfactory 70-79%	1(3.1)	9(19.1)	
Above average 80-89%	11(34.4)	6(12.8)	
Exceptional level 90-100%	0	0	

replacement therapies across the age continuum. Nursing care focuses on close assessment and monitoring of the patient during their dialysis treatment, patient, staff education, and dismissal planning in collaboration with the multidisciplinary team [11].

Based on the results of the present study half of the nurses between ages 20-29 and 30-39.



**Table 9:** Relationship between “nurses attended training programs/course” and the nurses 'total level of skills.

Nursing Standard	Skills		P value
	Yes 74	No 5	
<b>Pre</b>			
Unsatisfactory 60-67%	1(1.4)	1(1.2)	-0.016
Satisfactory 70-79%	25(33.8)	0	
Above average 80-89%	48(64.9)	4(80.0)	
Exceptional level 90-100%	0	0	
<b>Initiating</b>			
Unsatisfactory 60-67%	67(90.1)	4(80.0)	0.063
Satisfactory 70-79%	6(8.1)	1(2.0)	
Above average 80-89%	1(1.4)	0	
Exceptional level 90-100%	0	0	
<b>During</b>			
Unsatisfactory 60-67%	74(100)	5(100)	0
Satisfactory 70-79%	0	0	
Above average 80-89%	0	0	
Exceptional level 90-100%	0	0	
<b>Post</b>			
Unsatisfactory 60-67%	48(64.9)	4(80.0)	-0.05
Satisfactory 70-79%	10(1.35)	0	
Above average 80-89%	16(21.6)	1(20.0)	
Exceptional level 90-100%	0	0	

That means the studied nurses is mixed with newly graduate and expert nurses which is disagree with Ismailia hospital study where their age between twenty to less than thirty years, which might be related to their new graduation [12].

The results of the present study revealed that the majority of studied nurses are males and this is disagree with study that was done at Khartoum State who reported that majority of nurses are female [13].

With regard to attending training courses the study was found that majority of studied nurses attended training course about patients care in Hemodialysis Unit this is in disagree with Abdelfatah [14] and Bakery [15].

Our study revealed that all studied nurses had unsatisfactory practice regarding care for patients during hemodialysis and this is in concordance with study done in Ismailia hospital which measuring practice of nurses pre and during and post dialysis [12].

Infection remains one of the greatest risk factors to morbidity and mortality for the dialysis population. The ANZDATA report summary (ANZDATA, 2010) [8].

Has reported 116 of all deaths in the dialysis dependent population in 2010 were due to infection.

The Canadian Morbidity Study showed a 4.56 rate for AVF infection and a 17.96 for AVG infection in the first year of follow up, this disagree with our study where practicing of Dual lumen catheter dressing change is 59.1%

The study revealed that a significant relation between age and skills post and during dialysis  $p < 0.000$  and significant relation between marital status and skills  $p = 0.244^*$ .

Pre dialysis, and also there is significant relation between years of

experience, nationality and skills  $p < 0.000$  during dialysis in both lastly there is significant relation between the study group who attained training program and skills where  $p < 0.000$ .

## Conclusion and Recommendation

Most of the nurses participated in this study are non-Saudi, female and married aged between 20-29.

Majority of nurses have nursing diploma in dialysis with 5 years or less experiences as a hemodialysis nurse, but they do not attend to any training programs/course about

## Hemodialysis

According to the study's results and findings, the following recommendations can be drawn:

- The hospitals should implement new educational plans to increase nurse's level of knowledge standard policy and procedure for patients undergoing hemodialysis process including pre, initiating, during, post dialysis stages.
- Improving hospital work environment and improve the health care system to include.
- The decision-makers in the hospitals should encourage and motivate nurses to attend training programs/course related to hemodialysis.

## References

1. Papadakis E. Approach of patients with kidney disease and patients with beta-thalassemia in a general hospital in Crete and investigation of their quality of life. Thesis. 2010.
2. Krans B. Dialysis. 2012.
3. Gerasimoula K, Lefkothea L, Maria L, Victoria A, Paraskevi T Maria P. Quality of life in hemodialysis patients. *Mater Sociomed*. 2015; 5: 305-309.
4. Ran KJ, Hyde C. Nephrology nursing practice: more than technical expertise *European Dialysis and Transplant Nurses*. 1999; 4: 4-7.
5. *Medicine Net Hemodialysis, Treatment for Kidney Failure* 2014.
6. Al-Sayyari AA, Shaheen FA. End stage chronic kidney disease in Saudi Arabia. A rapidly changing scene. *Saudi medical journal*. 2011; 4: 337-346.
7. Nursing Help. Complications of Hemodialysis and their management For Nursing.
8. Smeltzer S, Bare B, Hinkle J, Cheever K. Brunner & Suddarth's Textbook of Medical-surgical Nursing. 2010; 1: 1322.
9. Davila L. Dialysis Nursing Careers and Training Information.
10. Ebaidoo IK, Asare-Kumi AA, Nortey EN, Kodom EB. Profiling Patients Healthcare Quality Perceptions: A. 2016; 5.
11. Rajeswari R, Sivamani L. Nursing Care in Dialysis. *Dialysis Technician Government General Hospital*. 2010; 3: 1-4.
12. Ebrahim AA, Al-Mawsheki. Knowledge attitude and practice regarding Care for the Patients during Hemodialysis. 2016; 1135-1141.
13. Abdelsatir S. Evaluation of Nurses Awareness and Practice of Hemodialysis Access Care in Khartoum State Sudan. 2013; 6: 119-121.
14. Abdelfatah AHA. Assessment of Nurses' Knowledge and Practice Related to Nursing Care of Children Undergoing Hemodialysis at Assiut City. Unpublished Master Thesis, Department of Medical Surgical Nursing Science. Faculty of Nursing, Assiut University. 2013.
15. Bakey SJ. Evaluation of Nurses' Practices throughout Hemodialysis Treatment for Patients in hemodialysis unit at Baghdad teaching hospitals. *Kufa Journal for Nursing Sciences*. 2014; 2: 2014.