

Nurses Compliance to Standards of Nursing Care for Hemodialysis Patients: Educational and Training Intervention

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Abstract: Quality of nursing care of hemodialysis patient should be conforming to standards of care, which are considered as a starting point for better and excellent practice. **Aim** of this research was to evaluate the efficacy of education and training interventions on nurse's compliance to standard of nursing care for hemodialysis patient. **Design:** Quasi-experimental design was used. **Setting:** this study was conducted in hemodialysis unit at El-Menia University Hospital, Egypt. **Sample:** Convenience samples of 41 nurses were female, experienced in hemodialysis care of patients Dec 2016 - Nov 2017. **Tools:** A questionnaire examining knowledge and an observational checklist for the performance were used for data collection. **Results:** Reveal that (68.3%) of nurses weren't aware of hemodialysis nursing care standards. More than half of nurses (61.0% - 56.1%) hadn't attended conference during the past 5 years and attended hadn't educational lectures respectively. There were increasing percent in nurses achieved very good and excellent overall total knowledge and performance in the post-test and the follow-up compared with the pre -test periods, increase in total mean scores for the observations related to overall performance of infection control. there was a strong positive relationship between nurses knowledge and their performance were dedicated in the post tests at ($P < 0.001^{**}$). **Conclusion:** Based on the results of this study, education and training interventions were effective ways in achieved progressive improvement of the nurses' knowledge and skills, toward adopted standard of nursing care for hemodialysis patient.

Keywords – standards of care, hemodialysis, education, and training intervention.

Date of Submission:20-04-2018

Date of acceptance: 05-05-2018

I INTRODUCTION:

Quality has become an increasingly predominant part of our lives. Patient are constantly looking for quality care and services (1). In nursing care of hemodialysis patient, quality is a complex concept that has multiple perspectives including the technical and personal aspects also it should be conforming to standards of care, which are considered as a starting point for better practice. Without specified standards, judgments made in the evaluation process may be variable, subjective, and susceptible to the whims and biases of the evaluators (2). In dialysis unit quality healthcare is very important because it is a critical unit needed nurses have fully aware of patient standards care. (3).

In addition, quality healthcare 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 (4). 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.

The standards of professional nursing practice are authoritative statements of the duties that all registered nurses, despite of role, a level of care or performance, values and priorities, population or specialty are expected to perform competently” by which the quality of nursing practice can be judged (6). Standards can be classified and formulated according to frames of references (used for setting and evaluating nursing care services) relating to nursing structure, process and outcome, because standard is a descriptive statement of desired level of performance against which to evaluate the quality as possible what is up to standard and what is not acceptable. Further, (7) mention that, where structure relates to the process and process leading to better outcome.

Dialysis is the methods of treatment of end stage renal (ESRD) diseases (3). Hemodialysis is one of methods of renal replacement therapy. It is the mainly used method of dialysis. (8), is a life-saving treatment,

patient undergoing hemodialysis procedure requires specially trained staff and special nursing care during phases of dialysis (the predialysis phase, the intradialytic phase and the termination phase). However; hemodialysis is accompanied by several complications (9). These complications remain as a major cause of morbidity and mortality in hemodialysis patients. Some complications may not threaten the patients' life but deteriorate the quality of life of patients (10).

Above all complication can be divided into complications associated with hemodialysis equipment such as; hemodialysis device, water system, membrane and vascular access-related complications (11) & (9). Moreover, neurological complications and complications associated with use of anticoagulant therapy. Furthermore, hematologic complications and others complications as nausea vomiting, itching, muscle cramps & infection (11) & (12).

End-stage renal disease (ESRD) is a health problem that requires long-term and costly care (10). The burden of chronic renal failure (CRF) is increasing sound the alarm proportion all over the world. This occurs in many countries with an increasing prevalence (13) & (14). Greater than 50 million people throughout the world well-known to have chronic kidney disease, and above one million require renal replacement therapies such as dialysis and renal transplantation. (15) & (10).

The incidence of (CRF) in population for developed countries were six – eight per 100.000 /per year (16). (ESRD) has extensively increased in developing countries such as Egypt. (17). ESRD of hospitalized patient is approximately 1.68% of all hospitalized Egyptian patients and indicated that, Egypt is the leader of the list of countries in terms of high mortality rate of patients with kidney failure, as 25% of patients die annually, While the global death rate of this disease is only 10% .Also the incidence of kidney failure patients from October 2015 to November 2017 who was admitted at artificial kidney dialysis unit in El Minia University hospital are 171patients(18).

Also, in Egypt note compliance with developed practice guidelines were not standardized across the haemodialysis facilities which comparing some sub items in Giza and Cairo governorates .This denotes an unsystematic approach in the Egyptian haemodialysis units and variability in adoption of evidence-based guidelines between facilities affiliated to the Ministry of Health and Population (20).

Significance of the study

There are an increasing incidence and prevalence rate of patients treated by dialysis. The mortality rate among patients receiving chronic hemodialysis is high and greater than that of any other diseases (21). Besides hemodialysis nurses have reported a lack of compliance with established hemodialysis policies and procedures and a feeling of 'always needing to rush' to get patients in and out for hemodialysis unit and treatment as ongoing barriers to patient safety (22). The main goal of nursing standards is to improve the health and well-being of all patients. In Egypt it was observed that, there is insufficient information about the quality and promote standards of nursing care generally in hemodialysis units and particularly in hemodialysis unit at El-Minia University Hospitals. So, there must be a clear identification of the skills and knowledge required by the nurse through educational intervention to carry out patient care effectively (23) & (24).

Moreover, nurses constitute the largest number of personnel working in hemodialysis units. Any defect in their performance will affect the level of quality of care giving to the patient and patient life. For these reasons this study will be conducted to implement adapted nursing care standards for hemodialysis patient at El-Minia University Hospital. And it was the first time for most of nurses to be aware and know about standards of care as well as the presence of a national guidelines for hemodialysis nurses which add weight to this study.

II Aim Of The Study:

to evaluate the efficacy of education and training interventions on nurses compliance to standard of nursing care for hemodialysis patient. Through, improve and evaluate the knowledge and performance of hemodialysis nursing staff before and after the education and training interventions.

Research questions were:

1. What were the differences in the knowledge of haemodialysis nurses' before and after the participation in an education intervention that used adapted standards of care?
2. What were the changes in performance/behaviour of haemodialysis nurses who participated in an education intervention that used adapted standards of care?
3. Was there a relationship between nurses' knowledge and their performance during pre – post & follow-up periods?

III Subjects And Methods:

Research design:

A Quasi-experimental design was utilized to accomplish the aim of the study.

Sample and Setting

A convenience sample of 41 nurses working in the hemodialysis unit at El-Menia University Hospital. Were provided direct care to hemodialysis patients. The capacity of the hemodialysis unit is 20 beds divided into five rooms containing 4 beds each, a separate room for patients with hepatitis B virus that contains 2 beds. The education and training intervention conduct during December 2016 - November 2017.

Data collection tools.

Three tools was developed by the researcher based on review of literature guided by **Department of health & Human services (2016); (26) ;(27) ; (28) , (30); (29) and (32)** to fulfil the aim of education and training intervention. The conceptual model that guided this study was based on the Donabedian model of continuous quality improvement. .

Tool (1): Assessment Sheet: comprised of three parts:

Part I: consisted of (3 items) related to personal data including ages, qualifications, level of experiences for nurses.

Part II: consisted of (5 questions) to assess the nurses awareness about standards of nursing care, available sources to acquire knowledge and continuing education in the hemodialysis units.

Part III: consisted of (12 questions) about structure and how work is done in the hemodialysis unit.

Tool (2): knowledge questionnaire:

Was used to assess nurses' knowledge about care of patients receiving hemodialysis. It contained 35 multiple choice questions that were categorized under 5 sub items e.g., Clinical manifestation, Dialysis machine, Shunt care, Nutrition and medication lastly infection control. The correct answer scored 1 whereas incorrect answers were scored zero. Then the total nurse's knowledge score was divided as followed: poor (< 60 %), satisfactory (60 - < 75 %) and very good and excellent ($\geq 75\%$).

Tool 3: Observation checklist:

The observational checklist were categorized into 5 main parts: hemodialysis phases, infection control measures, health education, collaboration with health care team, and environment of the unit. The scoring system for the observation checklist items was evaluated as score (2) for complete done, score (1) for incomplete done and score (0) for not done. Then the total nurses' performance score was divided as followed: poor (< 60 %), satisfactory (60 - < 75 %) and very good and excellent ($\geq 75\%$).

Content validity and reliability:

The content validity of both the knowledge questionnaire and observation checklist was evaluated by 6 experts from Medical surgical nursing Staff, Administration nursing staff & medicine Staff. Modifications were carried out on clarity of the contents and appropriateness of sentences according to the expert comments. Test-retest reliability was done. Using Cranach's alpha to compute correlation between the items on the first and second time of applied tools. This was done with four weeks interval on the same nurse. Test-retest reliability for knowledge questionnaire (0.940, 0.83, 0.961, 0.945& 0.900) and observation checklist (.948, .879, .951, .906 &.961) (17-18 -19) .

Pilot Study:

A pilot study was administered among 10 pilot samples in the hemodialysis unit . The rationale of the pilot study was to determine the clarity, applicability, and relevance of the questions. It also gave the researchers experience how to estimate the needed time to fill in questionnaire sheet and checklist and how the content was clear for the nurses. Based on the results of the pilot study no modify was done and the sample was added to the total study.

Ethical consideration.

Before any attempt to collect data, an official approval was obtained from the medical director of the hospitals. The aim of the study was fully explained before obtaining the study sample and oral consent to participate. Even so in this study, the principles of anonymity and confidentiality were assured.

Filed work:

A questionnaire and observation checklist were developed by the researchers as a tool to collect data in order to evaluate the efficacy of education and training interventions on nurses compliance to standard of nursing care for hemodialysis patient. Three periods of data collection: a pre-test, reassessed immediately after the program implementation and then 3 months after the first assessment. Data collection was conducted through three phases: interviewing and assessment phase, implementation phase, and evaluation phase.

Interviewing and assessment phase:

During the first session the researcher explained the aim of the study and the components of the tools .The knowledge assessment sheet was distributed for nurses (pre) to assess nurses’ knowledge about care of patients receiving hemodialysis. Then observational checklist (pre) to assess nurses’ performance before an intervention. The program prepared and developed according to the nurse's needs of knowledge and practices that can help them

Implementation phase:

Based on the findings of the pre-test, an education and training interventions were implemented to study participants. Also, the contents of the program have been explained to other health team members present in unit. The program implementation was within the schedule of their working hours in specific room in hemodialysis unit ,10 session were applied in 10 days and repeated ten times (10group of nurses each contains4-5 nurses) each session was take from 45-60 mines. The researchers provided all lectures and implemented all portions of the educational intervention. The education and training intervention covered the following topics; Standards of care and quality care in dialysis unit, hemodialysis phases (Pre-dialysis, Intra-dialysis, Intra-dialysis problems and Termination phase of dialysis); Infection control in hemodialysis and health education to the patient; collaborate with health care team and family.

Limitations of the study:

Patient outcome data were not collected and study was apply in only one dialysis unit, so results may be limited to units of similar size and employee characteristics. However, the setting for this study is similar to other hospital-based dialysis units in the region.

Evaluation phase:

Nurses were reassessed immediately after the program implementation and then three months after the first assessment.

Statistical design.

Frequencies were calculated to describe demographic characteristics of the study sample, total knowledge and performance. Mean differences, and, standard deviations were compared using a Repeated Measured ANOVA-test which was set at $p>0.05$ to determine a significant difference between in the knowledge, skills, and attitudes toward adapted standards of care for hemodialysis patients before, after and three months following the intervention. Pearson correlation- test was used to determine a significant difference in nurses knowledge and skills. All analyses were obtained using the statistical package for social sciences (SPSS) version 21.

Figure 1: Frequency distribution of staff nurses as regards personal characteristics. (N=41).

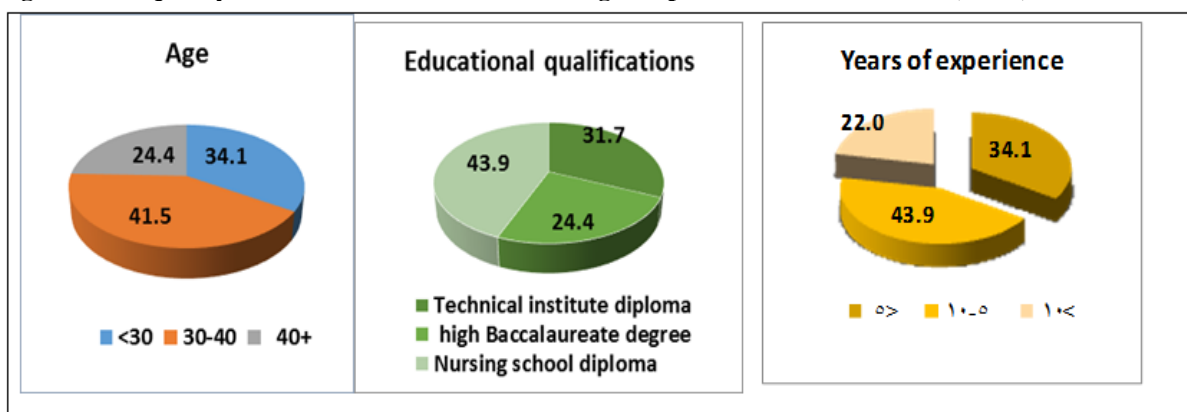


Figure 1,2,3 illustrated that the general characteristics of the study sample , all nurses were female , nearly half of nurses had diplomas nursing school the majority of nurse were 41.5% age ranged from 30 to 40 years and 43.9% had years of experience ranged from 5 to 10 years.

Table 1. Frequency distribution of nurses' awareness about the available sources to acquire knowledge in the hemodialysis units. (N=41).

Items	Yes		No	
	N	%	N	%
Aware of hemodialysis nursing care standards	13	31.7	28	68.3
There is an orientation program for new nurses	41	100.0	0	00.0
The unit - hospital organizes staff development programs for nurses	0	00.0	41	100.0
Attended a related conference during past 5 years	16	39.0	25	61.0
Participated in educational lectures	18	43.9	23	56.1

Table 1. Reveals that all of the studied nurses (100%) had attended an orientation program. While (68.3%) of them weren't aware of hemodialysis nursing care standards. More than half of nurses (61.0% -56.1%) hadn't attended conference during the past 5 years and attended hadn't educational lectures respectively. Moreover, no nurses reported attending a unit- or hospital-based staff development program

Table 2: Frequency distribution of nurse's awareness about hemodialysis unit structure and processes.

Items	Yes		No	
	N	%	N	%
The hemodialysis unit includes:	41	100.0	0	00.0
Patient assessment forms				
Forms for assessment of A-V fistula	10	24.4	31	75.6
A dietitian	0	00.0	41	100.0
A social worker	0	00.0	41	100.0
Follow up of abnormal lab investigations	16	39.0	25	61.0
Quality improvement program	0	00.0	41	100.0
An infection control team	41	100.0	0	00.0
Role of the team:	41	100.0	0	00.0
- Keep unit clean to avoid infections				
- learn nurse infection control method	0	00.0	41	100.0
Periodic estimation of incidence of infections	9	22.0	32	78.0
Periodic estimation of mortality	0	00.0	41	100.0
Periodic investigation of machines water supply	41	100.0	0	00.0
sampling of water coming out of filters	41	100.0	0	00.0

Table 2. illustrates that all of the nurses (100.0%) confirmed the presence of patient assessment forms in the unit, aware of periodic investigation of the machines' water supply, aware of the need for regular sampling of water coming out of filters and presence of an infection control team but all reported that , the role of the team give order only to keep unit clean to avoid infections without teaching anyone about infection control method. While, all of the nurses (100.0%) confirmed the absence of a dietitian, a social worker, and quality improvement program in the unit and none of them were aware of the presence of periodic estimation of mortality. The majority of the nurses (75.6%) confirmed the absence of forms for the assessment of A-V fistula and (61.0%) of nurses not followed up abnormal lab investigations. Also results revealed only nine nurses were aware of the presence of periodic estimation of the incidence of infections.

Table 3. Nurse knowledge about hemodialysis care throughout subcategory study phase

Statistically significant at $p < 0.05$

Sub items	Time									F test	P value
	pre-intervention			Immediate post intervention			follow-up				
	Mean	±	SD	Mean	±	SD	Mean	±	SD		
Clinical manifestation	6.95	±	1.51	9.12	±	1.28	10.39	±	.66	182.53	.000
Dialysis machine	4.39	±	1.22	5.29	±	.87	5.92	±	.34	29.47	.000
Shunt care	2.90	±	.30	2.85	±	.35	3.00	±	.00	3.34	.046
Nutrition and medication	5.26	±	1.30	7.34	±	1.52	8.26	±	.94	82.27	.000
Infection control	4.58	±	.99	5.95	±	.80	6.29	±	.60	52.88	.000

Statistically significant at $p < 0.001$

Table 3. Shows that there were increase in mean scores for nurses who achieved progressive improvement in each subcategory of knowledge about clinical manifestation, dialysis machine, shunt care, nutrition and medication , and infection control between pre ,post & follow up. Also revealed that there were statistically significant differences between pre ,post & follow up ($P < 0.001$).

Figure 2. Percent of nurses achieving improvement of total knowledge throughout study phases. (N= 41)

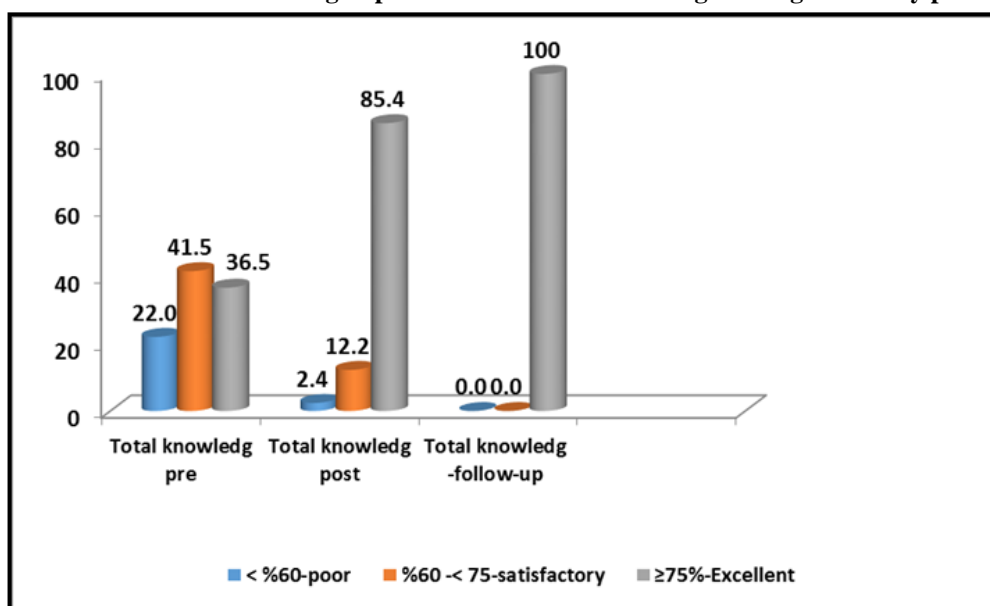


Figure 2. Summarizes the percent of nurses regarding total knowledge. This figure reveals that only 41.5% of nurses had satisfactory knowledge in the pre intervention period compared with the total percent 85.4% in the post test, which achieved very good and excellent total knowledge in the post intervention period and all of nurses 100.0% which continued to achieved very good and excellent overall total knowledge in the follow up period.

Table 4. Nurses achieving performance improvement in total and each subcategory of hemodialysis phases throughout study phases.

Sub items	Time									F test	P value
	pre-intervention (n= 41)			Immediate post intervention (n= 41)			follow-up (n= 41)				
	Mean	±	SD	Mean	±	SD	Mean	±	SD		
Pre-dialysis phase: Preparing equipment	22.51	±	2.71	25.29	±	1.96	26.51	±	2.36	126.37	.000
Preparing patient	22.87	±	2.67	28.02	±	3.01	28.02	±	3.01	227.26	.000
Preparing machine	27.68	±	2.36	29.73	±	4.91	29.73	±	4.91	8.50	.006
Total pre-dialysis phase:	73.07	±	5.94	83.04	±	7.23	84.26	±	7.23	98.85	.000
Intra-dialysis phase: Preparing self	4.26	±	.97	5.82	±	1.35	6.85	±	1.31	110.24	.000
Preparing patient	50.58	±	5.63	54.24	±	5.37	69.56	±	76.09	112.58	.000
Total intra-dialysis phase :	54.85	±	6.15	60.07	±	6.14	64.21	±	5.76	187.28	.000
Intra-dialysis phase problems	89.53	±	9.89	106.70	±	8.47	114.02	±	5.85	717.70	.000
Termination-dialysis phase	27.21	±	2.77	27.21	±	2.77	29.73	±	2.78	117.29	.000

Statistically significant at $p < 0.05$

Statistically significant at $p < 0.001$

The table 4. Reveals that all of the nurses had achieved progressive improvement in total performance about pre-dialysis with mean score \pm SD increased to 25.29 ± 1.96 in the post intervention period and 26.51 ± 2.36 in the follow-up period that there were statistically significant improvement in each subcategory of performance about preparing equipment, preparing patient and preparing machine. Additional improvement in total performance of nurses regard intra-dialysis with mean score \pm SD increased to 60.07 ± 6.14 in the post intervention period and 64.21 ± 5.76 in the follow-up period that there were statistically significant improvement in each subcategory of performance about preparing self and preparing patient during hemodialysis phase . The

table also reveals nurses had achieved progressive improvement in total performance about intra-dialysis problems and termination phase of dialysis.

Table 5. Nurses achieving performance improvement in total and each subcategory infection control and health education throughout study phases.

Sub items	pre-intervention (n= 41)			Immediate post intervention (n= 41)			follow-up (n= 41)			F test	P value
	Mean	±	SD	Mean	±	SD	Mean	±	SD		
Infection control measures:	9.34	±	1.45	13.95	±	2.02	17.70	±	1.92	571.72	.000
Related to patient											
Related to team	38.00	±	6.92	44.12	±	6.13	49.7073	±	9.52	289.10	.000
Related to machine/equipment	3.17	±	.38	3.17	±	.38	4.7805	±	1.47	53.28	.006
Related to environment	9.82	±	4.71	17.95	±	5.52	24.82	±	5.07	201.50	.000
Related to safety/emergency	7.51	±	1.64	8.95	±	.21	12.36	±	2.34	94.85	.000
Related to waste management	12.56	±	3.33	16.43	±	2.54	19.31	±	2.03	120.96	.000
Total infection control	80.41	±	15.99	104.58		14.20	128.70	±	15.97	766.79	.000
Health education:											
General instructions	24.02	±	5.24	31.07	±	4.67	35.21	±	3.07	268.96	.000
Vascular access	18.58	±	4.35	25.53	±	3.49	26.60	±	2.39	199.48	.000
Diet and fluid restriction	15.36	±	4.14	22.04	±	3.47	24.58	±	2.53	181.26	.000
Total health education:	57.97	±	12.65	83.53	±	34.70	86.41	±	6.19	263.42	.000

Statistically significant at $p < 0.05$

Statistically significant at $p < 0.001$

Table 5. clarifies that, there were increase in total mean scores for the observations related to overall performance of infection control and sub item related to; patient, team, environment, safety/emergency and waste management were low in the pretest compared with the total mean scores in the post test and follow-up test. On the same line, results were also reported regarding observation of the total health education and sub items general instructions, vascular access and diet and fluid restriction low in the pretest compared with the total mean scores in the post test, which continued to improve even more in the follow-up test. In summary, there were significant improvement in overall performance of infection control and health education in post and follow-up tests at ($P < 0.001$).

Figure 3. Percent of nurses achieving improvement of overall performance throughout study phases. (N= 41)

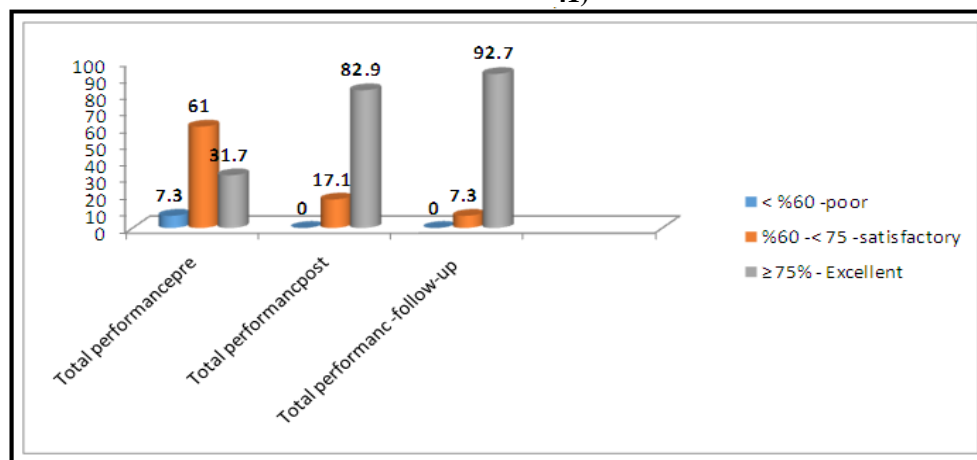


Figure 3. Observations related total percent of nurses performance reveal that only 41.5. % of nurses had satisfactory performance in the pre intervention period compared with the total percent 82.9% of them who achieved very good and excellent improvement about overall performance in the post intervention period.

Similar results were also reported nearly all 92.7.0% of nurses which continued to achieved very good and excellent improvement about overall performance in the follow up period.

Table 6. Percent of total observational checklist of collaboration of nurses, facilitates quality assurance in the unit and the environment of the unit at each time period.

items	pre (n= 41)		post (n= 41)		follow-up (n= 41)		X2	P-value
	No	%	No	%	No	%		
The nurse collaborate with all members of the health care team:- <ul style="list-style-type: none"> • < %60-poor • %60 -< 75-satisfactory • ≥75%-Excellent 	41	100.0	41	100.0	32	78.0	12.90	.000
	0	00.0	0	00.0	9	22.0		
	0	00.0	0	00.0	0	00.0		
The nurse facilitates quality assurance in the unit: <ul style="list-style-type: none"> • < %60-poor • %60 -< 75-satisfactory • ≥75%-Excellent 	41	100.0	39	95.1	39	95.1	33.39	.000
	0	00.0	2	4.9	2	4.9		
	0	00.0	0	00.0	0	00.0		
The environment of the unit: <ul style="list-style-type: none"> • < %60-poor • %60 -< 75-satisfactory • ≥75%-Excellent 	41	100.0	41	100.0	41	100.0	--	P>0.05
	0	00.0	0	00.0	0	00.0		
	0	00.0	0	00.0	0	00.0		

Table (6) show that all the participants nurses collaboration with all members of the health care team had no change (poor) in performance throughout post, but slightly change (22.0%) had satisfactory in follow up .As regard to the nurse facilitates quality assurance in the unit there is a slight change in the post1 and follow up from pre assessment .But there is no changes related to environment of the unit in post and follow up period.

Table 7. Correlation between the nurse’s knowledge and their performance throughout study phases; pre, post and follow-up periods.

Study phases	Pearson correlation	
	r	P value
Pre-test	.850	.000**
Post-test	.530	.000**
Follow-up test	.219	.170

** . Correlation is significant at p < 0.001

Table 7. In summary, data analysis reveal that; there was a strong positive relationship between nurses knowledge and their performance in the pre and posttests at (P< 0.001**). However, data analysis revealed that there was no significant correlation between nurse’s knowledge and their performance in follow-up test.

Table 8. The relation between nurse's educational qualifications and their knowledge & performance throughout study phases. (N=41)

Nurses knowledge & performance	Educational qualifications						ANOVA -test	P-value
	Nursing school diploma (n=13)		Technical institute diploma (n=10)		High Baccalaureate degree (n=18)			
	Mean	±SD	Mean	±SD	Mean	±SD		
Nurses knowledge: Pre-test	27.07	1.705	26.60	2.54	20.55	3.92	21.567	.000**
Post-test	32.76	2.38	31.10	2.60	28.66	4.07	6.048	.005**
Follow-up test	34.61	1.89	33.30	2.90	33.66	1.08	1.531	.229
Nurses performance: Pre-test	430.76	16.20	399.40	16.86	339.55	32.70	52.74	.000**
Post-test	518.23	61.95	472.90	18.50	422.55	27.97	21.26	.000**
Follow-up test	542.38	13.03	516.90	10.45	476.77	27.27	40.84	.000**

** Highly statistically significant at P <0.001

* Statistically Significant at P <0.05

Table 8. Clarifies that highly statistically significant differences were found in relation to nurses knowledge pre and post-test and nurse's educational qualifications at (P<0.001**). However no statistically significant differences were found in relation to knowledge follow-up test and nurse's qualifications (p>0.05). An

additionally, results illustrate that highly statistically significant relation between nurse's qualification and their performance pre-, post& Follow-up program intervention at (P< 0.001**).

Table 9. The relation between nurses' years of experience and their knowledge & performance throughout study phases. (N=41)

Nurses knowledge & performance	Years of experience						ANOVA test	P-value
	<5 (n=14)		5-10 (n=18)		>10 (n=9)			
	Mean	±SD	Mean	±SD	Mean	±SD		
Nurses knowledge:								
• Pre-test	21.78	5.67	25.11	3.341	25.66	2.12	3.406	.044*
• Post-test	28.57	5.07	31.44	2.22	31.88	2.14	3.550	.039*
• Follow-up test	33.85	1.915	33.72	2.13	34.22	1.71	.193	.826
Nurses performance:								
• Pre-test	357.85	57.04	392.00	37.38	404.44	34.84	3.622	.036*
• Post-test	441.35	49.72	465.11	37.09	502.33	83.98	3.456	.042*
• Follow-up test	489.28	41.64	510.55	29.34	529.11	19.89	4.245	.022*

* Statistically Significant at P <0.05

Table 9. Shows present significant statistical relation between nurse's years of experience and their knowledge in pre and post-test (P< 0.05). While, no statistically significant relation between nurse's years of experience and their knowledge in follow-up test. Finally, data analysis revealed that there significant statistical relation between nurse's years of experience and their performance pre, post and follow-up program intervention at(P< 0.05).

IV Discussion

End-stage renal disease (ESRD) is a health problem that requires long-term and costly care. ESRD is not only increasing in incidence, but also a growing economic and organizational problem, consuming health care resources worldwide .The purpose of this study was to evaluate the efficacy of education and training interventions on nurses compliance to standard of nursing care for hemodialysis patient. Standards of care are essential and first steps for continuous quality improvement. It communicates clearly to everyone involved in the health care services.

The study occurred in the hemodialysis unit at El-Menia University Hospital in Egypt .Findings of the current study were discussed within the following frame of references:(a) Sociodemographic characteristics of the study subjects (b) the differences in the knowledge of hemodialysis nurses' before and after the participation in an education program of standards of care (c) the changes in performance/behavior of hemodialysis nurses who participated in an education- program of standards of care (d) a relationship between the nurses' knowledge and their performance during pre- post and follow-up phases.

(a)-Demographic characteristics of the study subjects;

The findings showed that more than one third of study participants were ranged age from 30 to 40 years, all of them were female, nearly half of nurses had nursing school diplomas and majority of nurses had years of experience ranged from 5 to 10. Similar demographics were reported in three studies conducted in different renal dialysis units in Egypt. One study by (36) reported that the majority of nurses were more than 30 years. **Mohamed (2009)** found that most of the participants were female. (36); (38) they reported that most of the participants had a diploma level of education(38)In contrast (37); (38) found that ;percentages for the participants nurse years of experience in work place from 6 – 10 years, (35.30% & 31.8% respectively).

According to nurses' awareness about the available sources to acquire knowledge in the hemodialysis units before the intervention

Findings of the present study reported that all nurses had attended an orientation program. This might be polices of hospital for new nurses working in hemodialysis unit. This results supported by nursing standards offered by (29) which stated that all nurses should participate in an orientation program especially in a specialized area of nursing similar to a hemodialysis unit. Also, (39) stated that an adequate orientation program minimizes the likelihood of rule violation and confusion, fosters the feelings of belonging, motivation, and enhances the moral state of the new employee. Conversely, this finding is in agreement with, (40); (41) they mentioned that orientation programs are required for unprepared new nurses to avoid stress and frustration in the work place and to help them gain necessary skills and confidence.

The present study finding indicated that no one of nurses attending a unit- or hospital-based staff development program and hadn't attended educational lectures. Also, nearly two third of nurses weren't aware

of hemodialysis nursing care standards. This might be lack of finances to support ongoing education, lack of interest or the absence of a motivational, the workload and supportive learning environment could be barriers to accessing sources of education for hemodialysis nurses. This is supported by (38) mentioned that the majority of nurses had no attending a unit- or hospital-based staff development program. Similarly, in Egypt, compliance with developed practice guidelines were not uniform across the haemodialysis facilities (20). This result was in agreement with (42) who reported that aware of nurses increase quality improvement, nurses had attended conference during the past 5 years and attended educational lectures.

Regarding to nurses awareness about hemodialysis unit structure and processes. The present study referred that all nurses confirm presence of an infection control team but all reported that, the role of the team give order only to keep unit clean to avoid infections without teaching any one about infection control method, this findings supported with (43). (USRDS). Reported that morbidity patients on haemodialysis unit has increased related to absence of enough staff trained to follow the infection control methods.

Additionally, all of the nurses participate in this study confirmed the absence of a dietician, a social worker, quality improvement program in the unit and all of them were not aware of the presence of periodic estimation of mortality. In the same line Agree with (36) who summarized that measures of infection or mortality were either not done or not reported to participants. Neither a dietician nor social worker was employed in the hemodialysis unit. Also, (44 ;45), mentioned that nephrology nurses should fully understand the role of the health care team members as nutritionist & psychologist in the renal unit to accomplished care of patients. These might be related to the insufficient numbers of trained personnel or funds to employ a dietician or social worker.

Moreover, majority of the participants confirmed the absence of forms for the assessment of A-V fistula and nearly two third of nurses not followed up abnormal lab investigations. Also results revealed only nine nurses were aware of the presence of periodic estimation of the incidence of infections. The current study findings were compatible with. (46) Pointed out that Failure to follow-up the fistula continually leads to increased infection. These findings suggest that there are structural barriers in the unit, including lack of documentation forms to meet standards of care.

(b) Regarding to nurses' knowledge about hemodialysis care.

There were statistically significant improvement in the mean scores of nurses' knowledge immediately post and follow-up intervention after implementation of program related to clinical manifestation, dialysis machine, shunt care, nutrition and medication, and infection control. Finally, there were increasing percent in nurses achieved very good and excellent overall total knowledge in the post-test and the follow-up compared with the pre -test periods.

This might be due to the comprehensive content of the educational program, its relevance to the field of their work, the written handbook of the program, which serves as an ongoing reference and may be that changes in practice based on the CANNT standards of care and the Egyptian guidelines for hemodialysis nurses also contribute to improvement in the participants' total knowledge scores. (48) Supported that significant improvement in nurses' knowledge after attending a program emphasized that improve the quality of care provided to patients and described the importance of reference books as an effective way to support staff development. Interestingly, (49; 50) they found that implementation of the standard with minimal education resulted in statistically significant improvements in the nurses' knowledge.

(c) Regard of nurses achieving performance improvement in total and each subcategory of hemodialysis.

Related to pre-dialysis phase, all of the nurses had achieved progressive improvement in total performance about preparing patients, equipment and machines with significant improvements in nurses' performance. In post intervention and follow-up period. These findings may be due to effect of the educational program. There were no staff development programs, and no new policies were implemented in the unit during the study time. Accordingly, this improvement in the nurses' performance was related to the effect of the intervention. Many researches supported this result: (50; 51) they stated that good practice is the result of theoretical understanding that helps nurses to acquire new skills and practice. In the same respect, (Areti et al, 2017) reflected that the importance of receiving accurate and timely information by skilled lead to increases nurses' performance.

Regarding to intra-dialysis phase, nurses had achieved progressive improvement in total performance about preparing patient& preparing themselves. There were significant improvements in the total mean score nurses' performance in the post and follow-up compared with the pre -test .These improvements were explained by the presence of some changes in the unit structure for patients such as the availability of resource. (53) Who stated that lack of human resources, guidelines, and regulations in certain hospitals often confuse nurse staff working in hemodialysis unit. **The Egyptian Ministry of Health and Population (2016)** emphasized that personal protective equipment should be available to dialysis personnel family, and visitors in the suitable sizes and should be monitored and enforced.

Regarding to intra-dialysis phase problem, after the implementation of the program, there was statistically significant improvement in nurses' knowledge & the nurse has been able to solve most of the problems faced by the patient during dialysis. This might be the concentration on nursing interventions during the program to increase nurses' knowledge. This result was consistent with various studies have clarified that after the implementation of the program there was significant improvement in their performance and be able to deal with any problem facing the patient. (53); (56), (36)

Related to termination phase of dialysis, the findings of the present study showed that there were significant improvements in the mean score nurses' performance in the post and follow-up. These findings are supported with other studies (58) (57; 50) they reported that after the implementation of universal precautions program there were statistically significant improvements in their performance after application.

Regarding to infection control measures and health education: The present study clarifies that, there were increase in total mean scores for the observations related to overall performance of infection control and sub item related to; patient, team, environment, safety/emergency and waste management were low in the pretest compared with the total mean scores in the post test and follow-up test and there were significant improvement in overall performance of infection control at ($P < 0.001$). These findings may be due effect of educational and training program, an adequate amount of equipment and supplies, increase supervision of nurses' and infection control team start to work effectively in the unit. (59) emphasized that supervision is an initial direction to ensure that staff meets the standards of care. As well as with (60) who stated that Nurses' commitment to infection control methods reduces disease and mortality

On the other hand, these findings were in disagreement with (61) who found that only about one third of the subjects in the hemodialysis units follow the recommended hand washing and glove changing practices. According to **Centers for Disease Control and Prevention (2014)** all waste management that are contaminated with blood should be discarded in a biohazard waste containers. The researcher and the head nurse of the unit take a formal approval from the medical director of the University Hospitals to collect the wastes from the rooms at the end of every shift to meet the recommended standards of care, so the units assigned people to do that under close supervision.

On the same line, results were also reported regarding observation of the total health education and sub items general instructions, vascular access and diet and fluid restriction low in the pretest compared with the total mean scores in the post test, which continued to improve even more in the follow-up test and there were significant improvement in overall performance of health education in post and follow-up tests at ($P < 0.001$). This is most likely due to the effect of the training program that focused on nurses' knowledge and highlighted the role of nursing in patient education. This result was consistent with various studies have clarified that be achieved nursing performance standard nurses must be educated properly because inadequate and incomplete performance of nurses in their work results from inadequate educational preparation (64). As well as with (65; 66) stated that, patient education is a core component of nursing care, especially for ESRD patients to promote self-care. Education helps patients make considerable life style changes such as dietary and fluid restrictions. Finally, **American Nurses Association (ANA). (2010)** emphasized the importance of continuous education as an effective way to improvement impact on the dialysis patient.

Finally, there were increasing percent in nurses achieved very good and excellent overall total performance in the post-test and the follow-up compared with the pre -test periods.

Relationship between the nurses' knowledge and their performance throughout study phases; pre, post and follow-up periods

Lastly, the present study results showed that there was a strong positive relationship between nurses knowledge and their performance were dedicted in the posttests at ($P < 0.001^{**}$). This strong positive relationship suggests knowledge and performance were related in this study. These may be due to the effect of the educational and training intervention, effort by nurses by attending our program. In the same line(67), found that there was positive correlation between nurse's knowledge and their performance i.e.. Increase in knowledge scores matches, also increase in practice scores. While, disagreed with,(36) who concluded that the relationship between the participants knowledge scores and their performance scores was not dedicted in the pre and post periods of the study.

V Conclusion

Based on the results of this study, education and training interventions were effective ways in achieved progressive improvement of the nurses' knowledge and performance, toward adopted standard of nursing care for hemodialysis patient, there were increasing percent in nurses achieved very good and excellent overall total knowledge & performance in the post-test and the follow-up compared with the pre -test periods, increase in total mean scores for the observations related to overall performance of infection control ,supporting

Donabedian model of process leading to better outcome. There was a strong positive relationship between nurses knowledge and their performance were dedicated in the post tests at ($P < 0.001^{**}$).

VI. Recommendation

The study provided an educational strategy and materials that can be used in a variety of Egyptian hemodialysis units. Further studies that link the acquisition of satisfactory knowledge and performance to patient and nurses outcomes are recommended. Other studies are needed also to determine other key elements that could improve the quality of care in these settings and in hemodialysis units

Reference

- [1] Mosadeghrad ,M .A: A Conceptual Framework for Quality of Care. *Mater Sociomed.* 2012; 24(4): 251–261. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3732361/>
- [2] Thomas, SA .Silver, A Rathe, P Robinson (2016):Feasibility of a hemodialysis safety checklist for nurses and patients: A quality improvement study. in *CKJ: Clinical Kidney Journal* 9(3)
- [3] Kim,, S.; Lee, H.Z.; Hwang, E.; Song, J.; Kwon, H.J.; Choe, K. Lived experience of Korean nurses caring for patients on maintenance haemodialysis. *J. Clin. Nurs.* 2016, 25, 1455–1463.
- [4] eBaidoo,I.K., Asare-Kumi,A.A, Nortey,E. N., and Kodom,E.B.,(2016): Profiling Patients Healthcare Quality Perceptions: A Baseline Study of the University of Ghana Hospital, *Health Science Journal*,(10). (5).
- [5] American Nurses Association. (2010). *nursing: Scope and standards of practice* (2nd ed.). Silver Spring, MD: Author.
- [6] Tejada-Tayabas, L.M.; Partida-Ponce, K.L.; Hernández-Ibarra, L.E. Coordinated hospital-home care for kidney patients on hemodialysis from the perspective of nursing personnel. *Rev. Lat. Am. Enfermagem* 2015,23, 225–233.
- [7] H Donabedian, A. (1980): *Exploration in quality assessment and monitoring: The definition of quality and approaches to its assessment.* Ann Arbor, MI, Health Administration Press.
- [8] Bray BD, Boyd J, Daly C et al. How safe is renal replacement therapy? A national study of mortality and adverse events contributing to the death of renal replacement therapy recipients. *Nephrol Dial Transplant* 2014; 29: 681–687.
- [9] Gomez, N.(2017) *Nephrology nursing scope and standards from practice.* American Nephrology Nurses Association: Pitman, NJ. Availableonline:<https://www.annanurse.org/professional-development/practice/scope-of-practice/nephrology-nursing> (accessed on 5 May 2017).
- [10] Pippias, M.; Kramer, A.; Noordzij, M.; Afentakis, N.; de la Torre, F.A.; Ambuhl, P.M.; Madre, M.I.A.; Monzón, F.A.; Åsberg, A.; Bonthuis, M.; et al. The European Renal Association-European Dialysis and Transplant Association Registry Annual Report 2014: A summary. *Clin. Kidney J.* 2017, 10, 1–6.
- [11] Santos, S.F. & Peixoto, A.J. (2010) Sodium balance in maintenance hemodialysis. *Semin Dial,* 23,6, 549-55.
- [12] Karakoc, A.; Yilmaz, M.; Alcalar, N.; Esen, B.; Kayabasi, H.; Sit, D. Burnout Syndrome Among Hemodialysis and Peritoneal Dialysis Nurses. *Iran. J. Kidney Dis.* 2016, 10, 395–404.
- [13] Battistella, M., Bhola, C. & Lok, sC.E. (2011). Long-term Follow-up of the Hemodialysis Infection Prevention With Polysporin Ointment (HIPPO) Study: A Quality Improvement Report. *Am J Kidney Dis,* 57, 3, 432-41
- [14] Hayes, B.; Douglas, C.; Bonner, A. Work environment, job satisfaction, stress and burnout among haemodialysis nurses. *J. Nurs. Manag.* 2015, 23, 588–598.
- [15] Power, A., Hamady, M., Singh, S., Ashby, D., Taube, D. & Duncan, N.(2010) High but stable incidence of subdural haematoma in haemodialysis--a single-centre study. *Nephrol Dial Transplant,* 25,7, 2272-5
- [16] Zahran, M., and Frances M. (2010): Abo Yousef H. Etiology mode of treatment and outcome of children with CRF in Egypt. *Journal of Arab children* 11(3): 759 – 81.
- [17] Soliman, A .R, Fathy , A & Roshd , D : 2012: The Growing Burden of End-Stage Renal Disease in EgyptPages 425-428 | received 28 Aug 2011, Accepted 09 Dec 2011, Published online: 20 Jan 2012 .
- [18] The central administration for national information center for health and population in Egypt, 2017.
- [19] Information data of statistical office in Minia Univeristy Hospital, 2017).
- [20] Ahmed,M.F. Allam,E.S. Habil,2 A.M. Metwally, N.A. Ibrahim,M. Radwan, M.M. El-Gaafary and M.A. Gadallah . (2013): Compliance with haemodialysis practice guidelines in Egypt, *Eastern Mediterranean Health Journal*, Vol. 19 No.(1) pp. 4-9.
- [21] Palmer, S.C.; de Berardis, G.; Craig, J.C.; Tong, A.; Tonelli, M.; Pellegrini, F.; Ruospo, M.; Hegbrant, J.; Wollheim, C.; Celia, E. Patient satisfaction with in-centre haemodialysis care: An international survey. *BMJ Open* 2014, 4, e005020. *Healthcare* 2017, 5, 36 10 of 11.
- [22] Kliger AS. Maintaining safety in the dialysis facility. *Clin J Am Soc Nephrol* 2015; 10: 688–69.
- [23] Linton, A.D. (2012): *Introduction to medical-surgical nursing.* 5th ed. New Jersey. Elsevier Saunders. 50, 918
- [24] Kavurmacı, M.; Cantekin, I.; Tan, M. Burnout levels of hemodialysis nurses. *Ren. Fail.* 2014, 36, 1038–1042.
- [25] Department of health & Human services (2016):Centers for Disease Control and Prevention. VERSION 1.4 – SEPTEMBER 2016. <https://www.cdc.gov/infectioncontrol/pdf/icar/dialysis.pdf>
- [26] Smith, S.F., Duell, D.J. and Martin, B.C. (2016): *Clinical nursing skills: Basic to advanced skills.* 9th ed. Pearson-Prentice Hall, 745-752.
- [27] Pessoa, N., Linhares, F. (2015) Hemodialysis Patients with Arteriovenous Fistula: Knowledge, Attitude and Practice. *Escola Anna Revista De Enfermagem.* 19 (1), 73-79.
- [28] Pasticci, F., Fantuzzi, A., Pegoraro, M., McCann, M., Bedogni, G. (2012) Nutritional Management of Stage 5 Chronic Kidney Disease. *Journal of Renal care.* 38 (1), 50-58.
- [29] Canadian Association of Nephrology Nurses and Technologists. (CANNT) (2014): Standards of nursing practice. Available at: www.cannt.ca/standards/nursing.
- [30] Centre for disease control and prevention,(2011): Division of Healthcare Quality Promotion (DHQP), <https://www.cdc.gov/nceizid/dhqp/index.html>
- [31] Ministry of Health and Population (2003): National Guidelines for infection control: Part II (infection control in special care settings).Ministry of Health & Population, central infection control unit. 36
- [32] Ministry of Health and Population (1998): National Guidelines for infection control: Part II (infection control in special care settings).Ministry of Health & Population, central infection control unit. 36.

- [33] Tavakol, M., & Dennick, R. (2011) Making sense of Cronbach's alpha. *International Journal of Medical Education*. 2:53-55. ISSN: 2042-6372
- [34] Kamal S, Salem S. *Introduction to Statistics analytical*, 5 ed, Institute of Statistics, Cairo University. 2011.
- [35] Sun, W., Chou, C.P., Stacy, A.W., Unger, J., and Gallaher, P. (2007). SAS and SPSS macros to calculate standardized Cronbach's alpha using the upper bound of the phi coefficient for dichotomous items. *Behavior Research Methods*, 39 (1), 71-81.
- [36] Hussein ,F.M (2011); A Thesis Submitted in Partial Fulfillment of the requirements for the Doctorate Degree nursing Administration (Implementing A Developed Nursing Care Standards for Hemodialysis Patients In Zagazig University Hospital
- [37] Mohamed,A.M.A(2009): Assessment of nurse's performance related to nosocomial infection prevention in kidney dialysis units at Damietta city. Master thesis in community Health Nursing, Faculty of Nursing, Zagazig University. Egypt, 89.
- [38] Eid.NM.,Abdel-Aziz.L.T:(2012)ProposedDevelopedStandards: Staff Nurses Compliance at Dialysis Unit *Greener Journal of Medical Sciences* ISSN: 2276-7797 Impact Factor 2012 (UJRI): 0.7634 ICV 2012: 5.98.
- [39] Marquis, B.L. and Huston, C.J. (2017): *Leadership roles and management functions in nursing: theory and application*. 9th ed. Lippincott, Williams & Wilkins, 541-554.
- [40] Formulary, N. (2010): *British Medical Association and the Royal Pharmaceutical Society of Great Britain*, London BNF. No 59.
- [41] Cherry, B. and Jacob, S.R. (2011): *Contemporary nursing: issues, trends, and management*. 5th ed. USA. El-Sevier co., 260-261
- [42] Koren, N. (2011): *Hospital environmental services, policy and procedure the compendium of standards of practice for nurses* available at <http://www.cno.org/paps/compendium.html>, March 2011.
- [43] United States Renal Data System(USRDS),2010annual data report. Atlas of end-stage renal disease in the United States. Bethesda,MD: National Institutes of Health,National Institute of Diabetes and Digestive and Kidney Diseases. Division of Kidney Urologic ,and Hematologic Diseases.
- [44] Garbin, M.G.; Chmielewski, C.M. Job analysis and role delineation: LPN/LVNs and hemodialysis technicians. *Nephrol. Nurs. J.* 2013, 40, 225–240.
- [45] Ndambuki, J. The level of patients' satisfaction and perception on quality of nursing services in the Renal unit, Kenyatta National Hospital Nairobi, Kenya. *Open J. Nurs.* 2013, 3, 186–194.
- [46] Ball, L.K.(2010).The button hole technique:Strategies to reduce infections .*Nephrology Nursing Journal*,37(5),473477.
- [47] Deaver,K.(2010).Preventing infections in hemodialysis fistula and graft vascular accesses. *Nephrology Nursing Journal*,37(5), 503-505.
- [48] Chen, C.C., Chiu, M.J., Chen, S.P., Cheng, C.M., & Huang, G.H. (2011). Patterns of cognitive change in elderly patients during and 6 months after hospitalisation: A prospective cohort study. *International Journal of Nursing Studies*, 48(3), 338-346
- [49] Fadem, S.Z.; Walker, D.R.; Abbott, G.; Friedman, A.L.; Goldman, R.; Sexton, S.; Buettner, K.;Robinson,K.;Peters, T.G. Satisfaction with renal replacement therapy and education: The American Association of Kidney Patients survey. *Clin. J. Am. Soc. Nephrol.* 2011, 6, 605–612
- [50] Kazley, A.S.; Johnson, E.E.; Simpson, K.N.; Chavin, K.D.; Baliga, P. Health care provider perception of chronic kidney disease: knowledge and behavior among African American patients. *BMC Nephrol.* 2014 ,15 ,112
- [51] Davita Dialysis. (2011). How dry weight and fluid gain affect dialysis patients. Davita Dialysis Web Site [On line]. Retrieved from <http://www.davita.com/dialysis/treatment/how-dry-weight-and-fluidgain-affect-dialysis-patients/a/1930>
- [52] Areti Stavropoulou 1, Maria G. Grammatikopoulou 2, Michail Rovithis 1, Konstantina Kyriakidi 3, Andriani Pylarinou 3 and Anastasia G. Markaki 3,* Through the Patients' Eyes:
- [53] Bennett, P.N. Technological intimacy in haemodialysis nursing. *Nurs. Inq.* 2011, 18, 247–252
- [54] Egyptian Ministry of Health and Population (2016): *National Guidelines for infection control: Part II (infection control in special care settings)*.Ministry of Health & Population, central infection control unit. 36
- [55] -Bent, C.L., Sahni, V.A. & Matson, M.B. (2011). The radiological management of the thrombosed arteriovenous dialysis fistula. *Clin Radiol.* 66, 1,1-12.
- [56] Mandolfo, S. & Gallieni, M. (2010). Use of oral anticoagulants to prevent central venous catheter-related thrombosis in hemodialysis. *G Ital Nefrol*, 27, 5, 490-7
- [57] Efstathiou G, Papastavrou E, Raftopoulos V, Merkouris A. Factors influencing nurses' compliance with Standard Precautions in order to avoid occupational exposure to microorganisms: A focus group study. *BMC Nurs* 2011;10:1.
- [58] -Maki, D.G., Ash,S.R., Winger, R.K. & Lavin, P. for the AZEPTIC Trial Investigators.(2010).A novel antimicrobial and antithrombotic lock solution for hemodialysis catheters: Amulti- center, controlled, randomized trial. *Crit Care Med*
- [59] Battistella, M., Bhola, C. & Lok, C.E. (2011). Long-term Follow-up of the Hemodialysis Infection Prevention With Polysporin Ointment (HIPPO) Study: AQuality Improvement Report. *Am J Kidney Dis*, 57, 3, 432–41.
- [60] Singh SP. Hepatitis B vaccine induced HBsAg positivity. *Hep B Annual* 2007;4:55-60. Available from: <http://www.hepatitisbannual.org>[Last accessed on 16 April 2014]
- [61] Pyrek KM. NIOSH Working Toward Answers to Key Respiratory Protection Questions. *Infection Control Today, Personal Protective Equipment* 2013;171 9. www.infectioncontrolday.com
- [62] -AmericanNursesAssociation(ANA).(2010).*Nursing:Scopeandstandards of practice*(2nd ed.). Silver Spring, MD: Author
- [63] Centers for Disease Control and Prevention. Hepatitis C FAQs for the Public. Available from: <http://www.cdc.gov/hepatitis/C/cFAQ.htm>[Last accessed on 16 April 2014]
- [64] Nobahar, M.; Tamadon, M.R. Barriers to and facilitators of care for hemodialysis patients; A qualitative study. *J. Renal. Inj. Prev.* 2016, 5, 39–44
- [65] Castner, D. (2011). Management of patients on hemodialysis before, during, and after hospitalization: Challenges and suggestions for improvements. *Nephrology Nursing Journal*, 38(4), 319-330
- [66] Bergjan, M.; Schaepe, C. Educational strategies and challenges in peritoneal dialysis: A qualitative study of renal nurses' experiences. *J. Clin. Nurs.* 2016, 25, 1729–1739.
- [67] Saleh, M. (2008): *NURSES COMPLIANCE TO STANDARDS OF NURSING CARE IN PERFORMING INVASIVE PROCEDURES AT ZAGAZIG UNIVERSITY HOSPITALS*, Master thesis, faculty of nursing, Zagazig University. pp:80, 95-99