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**EFFECT OF PRE ESTABLISHED NURSING CARE STANDARDS  
ON NURSES' KNOWLEDGE AND PERFORMANCE ABOUT  
HEMODIALYSIS VASCULAR ACCESS CARE.**

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**Abstract:**

Hemodialysis nurses have an essential role in ensuring conformity to the hemodialysis standards and providing effective and safe patient care. Also, hemodialysis nurses play a vital role in providing efficient, coordinated, and focused patient care ,tasks that contribute to direct patient care are subdivided into three phases (the pre dialysis phase, the intradialytic phase and the termination phase). Education and training are two components of staff development that occur after an employee's orientation. **Methodology:** quasi experimental research design was conducted in the hemodialysis unit of International Mansoura Hospital (IMH). Socio demographic data & Nurses' Knowledge about nursing care standards of hemodialysis vascular access patients questionnaire sheet was designed after reviewing the related recent literature to assess nurses' knowledge. It contains 12 questions related to nursing care standards of hemodialysis vascular access. Performance checklist regarding hemodialysis vascular access care including 12 steps was designed. All available nurses (30) during the study period employed in hemodialysis unit with various age, qualifications, years of experience, different level of education, and willing to participate voluntarily. **Results:** The present study revealed that: (a) the total means knowledge score of nurses was increased after sessions. (b) The total mean practice score of nurses was increased after sessions. **Conclusion:** Nursing care standards recommendations are essential for nurses working at the hemodialysis unit. Nurse's level of education and years of experience was positive correlation with their knowledge and performance, but it was not statistically significant.

**Key words:** Hemodialysis nurses, nursing care standards, nurses' knowledge

**Introduction:**

Hemodialysis requires a well-functioning vascular access that allows sufficient blood flow to achieve adequate clearance and blood dialysis <sup>(1)</sup>.vascular access offer excellent way for bacteria to invade blood stream of patients undergoing hemodialysis<sup>(2)</sup>. .

Hemodialysis nurse play an essential role in ensuring a standard of hemodialysis care by providing safe, effective patient care in a supportive and comfortable environment. Throughout the treatment process, the nurse also assists patients and their families in meeting all the challenges they face, encouraging them to feel strong,

capable, and eager to live a normal productive life <sup>(3)</sup>. Moreover, nurses constitute the largest number of personnel working in the hospital. Any deficit in their performance will affect the level of quality of care given to the patient receiving hemodialysis. So, there must be a clear identification of the skills and knowledge required by the nurse in order to carry out patient care effectively <sup>(4)</sup>.

CANNT Nephrology Nursing Standards provide a framework for nephrology nursing practice, linking professional practice accountabilities, competence, research, leadership and

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quality<sup>(5)</sup>. Standards of care communicate clearly to everyone involved in the health care services what level of services is expected in that organization <sup>(6)</sup>.

Hemodialysis nurses have an essential role in ensuring conformity to the hemodialysis standards and providing effective and safe patient care <sup>(7)</sup>.

**Aim of study:**

Evaluate the effect of pre-established nursing care standards on nurses' knowledge and performance regarding vascular access care at hemodialysis unit of International Mansoura Hospital.

**Hypothesis:** There will be an improvement between nurses' knowledge and performance before and after implementing the pre-established nursing care standards of hemodialysis patients.

**Materials & Method:**

**Study Design:**

Quasi experimental research design was utilized in this study.

**Setting:**

This Study was conducted at the hemodialysis unit of International Mansoura Hospital.

**Subjects:**

All available nurses during the study period employed in hemodialysis unit with various age, qualifications, years of experience, different level of education, who provide direct patient care, and willing to participate and give consent were recruited to achieve the aim of the study.

**Tools:** Two tools were used in this study.

**Tool 1:** Nurses' Knowledge about nursing care standards of hemodialysis access care questionnaire.

This tool was developed by the researchers after reviewing the related recent literature to assess nurses' knowledge about the nursing care standards of hemodialysis vascular access, this tool was consisted of two parts: <sup>(11,12,13,14,15,16,17,18,19,20,21)</sup>

**Part 1: Socio-demographic characteristics and medical information:**

This part included socio demographic characteristics of nurses working at hemodialysis unit such as (age ,level of education , years of experience ).In addition to questions related to nurses attendance to training program related to nursing care standards of hemodialysis patients.

**Part 2: Nurses' knowledge about nursing care standards to hemodialysis vascular access.**

Nurses' knowledge about nursing care standards to hemodialysis patients regarding hemodialysis vascular access it consisted of 12 items of multiple choices questions which modified and developed by the researcher.

**Scoring of nurses' knowledge:** A score one was given for correct answer and zero for incorrect or missed answer.

**Tool II :** Nurses' performance of the nursing care of hemodialysis vascular access.

This tool was developed by the researchers after reviewing the related recent literature to assess nurses' performance regarding the nursing care standards of hemodialysis vascular access<sup>(36,37)</sup>.

The rating scale for nurses' knowledge and performance was distributed as follow <sup>(15)</sup>

Rating scale	Percentage (%)	Score
Excellent	≥ 85	≥ 54.4
Very good	75 □ ▪ 85	48 □ ▪ 54.4
Good	65 □ ▪ 75	41.6 □ ▪ 48
Average	50 □□ ▪ 65	32 □ ▪ 41.6
Weak	▪ 50	▪ 32

**Methods:**

1. An official permission was issued from the faculty of nursing, Mansoura University to carry out the study.
2. An official letter was issued with approval from the director of the hospital after explanation of the purpose of the study and the schedule of data collection.
3. The tool was developed by the researcher after reviewing the related literature.
4. The tool was tested for content validity by a panel of medical and nursing experts and the modification was done (simplified words used to be understood by nurses).
5. The reliability of the developed tool was estimated using Chronbach's alpha test to measure the internal consistency of the tools. It was found that the reliability for nurses's knowledge questionnaire using Chronbach's alpha equation was ( $r = 0.823$ ) and, reliability for nurses's performance was ( $r = 0.865$ ). Also, reliability was measured using test retest method by using SPSS program version 16.0 which showed that reliability for nurses's knowledge questionnaire was ( $r = 0.719$ ) and, reliability for nurses's performance was ( $r = 0.764$ ).
6. Nurse's oral consent was obtained after explanation of the objective of the study and confidentiality and privacy was assured.
7. A pilot study was carried out on 10 nurses to test feasibility, clarity and applicability of the tool. Accordingly modifications were done and final form of the tool was reconstructed and ready for use.
8. Data collected through 3 phases to this study: the preparation phase, the implementation phase and the evaluation phase.
9. **Preparatory phase:** This period included translation of the Canadian Association of Nephrology Nurses and Technologists standards of care for hemodialysis patients from English to Arabic. Preparation also included developing a handbook that contained orientation about standards of care for hemodialysis patients.
10. **Implementation phase:** The researcher provided all lectures, and implemented all portions of standard sessions. each session lasted 45-60 minute included re demonstration. Because it was difficult to teach the whole number of nurses at the same time, nursing staff was divided into three shifts. The researcher classified every shift into two small groups with total six small groups.
11. **Evaluation phase:** The evaluation was done by post-test. The same knowledge questionnaire and observation checklist used in pre-tests were used in post test during the evaluation period.
12. The researcher coded the questionnaires to assure the anonymity of the subjects. Finally, the researcher scored the responses, and compiled them for data analysis.
13. Data were analyzed using the statistical package of social science "SPSS" software version 16.0 .the quantitative data were presented as numbers, percentages. The P value of  $< 0.05$  indicate a significant result while, P value of  $> 0.05$  indicates a non significant result.

**Results:**

The data collected and analyzed statistically and the results are categorized into 3 main parts: socio demographic characteristics, nurses knowledge and performance related to hemodialysis nursing care standards about vascular access.

**Table (5.1):** Distribution of study sample according to their socio demographic Characteristics (No = 30):

Items	No. (30)	100
Age group		
▪ <25 years	1	3.3
▪ 25 – 30 years	11	36.7
▪ 30+ years	18	60.0
Range	22- 34 years	
Mean ±SD	29.5 ±2.7 years	
Educational level		
▪ Nursing school	16	53.3
▪ Technical institute	1	3.3
▪ Bachelor	13	43.3
Years of experience		
▪ Less than 5 years	8	26.7
▪ 5 – 10 years	9	30.0
▪ 10+ years	13	43.3
Mean ±SD	7.9 ± 4.614	
Continuous training program		
▪ Participate	29	96.7
▪ Not participate	1	3.3
Presence of quality program		
▪ Available	30	100
▪ Not available	0	0

This table shows socio demographic characteristic of studied nurse. All participants were female and their ages ranged from 22-34 years with mean age 29.5 ±2.7 years. More than half of studied nurse (53.3 %) of nurses have nursing school, two fifths of studied nurses (43.3 %) have bachelor of nursing and only one nurse graduated from technical nursing institute. Slightly more than one quarter of studied nurse (26.7%) had less than five years of experience, and slightly more than two fifths of studied nurses (43.3%) had more than ten years of experience with mean 7.9 ± 4.614 years of experience.

**Table (5.2):** Nurses’ knowledge about hemodialysis vascular access care.

Items	Pre test				Post test			
	Incorrect		Correct		Incorrect		Correct	
	No.	%	No.	%	No.	%	No.	%
1. Checking efficiency of fistula	9	30	21	70	2	6.7	28	93.3
2. Proper method for fixation of fistula	25	83.3	5	16.7	19	63.3	11	36.7
3. Proper site for fistula needles placement	21	70	9	30	4	13.3	26	86.7
4. Assessment criteria for hemodialysis fistula	23	76.7	7	23.3	2	6.7	28	93.3
5. Proper direction of needle placement	25	83.3	5	16.7	4	13.3	26	86.7
6. Signs of fistula dislodgement.	11	36.7	19	63.3	9	30	21	70
7. Washing patient arm	22	73.3	8	26.7	8	26.7	22	73.3
8. Signs of complications of fistula.	8	26.7	22	73.3	0	0.0	30	100
9. Different types of hemodialysis access.	15	50	15	50	2	6.7	28	93.3
10. Complications of fistula	27	90	3	10	7	23.3	23	76.7
11. Sites of fistula creation	16	53.3	14	46.7	4	13.3	26	86.7
12. Causes of malfunction of fistula	9	30	21	70	4	13.3	26	86.7
Mean score ± SD	6.7667 ± 1.135				9.2333 ± 0.626			
Significance score	(t)test = 11.886				P value = 0.000			

This table showed that four fifths (83.3%) of nurses didn’t know proper method for fixation of fistula which improved after sessions to be two thirds (63.3%). About three quarter (70%) of nurses didn’t know proper site for fistula needles placement, which improved after sessions to be (13.3%). About three quarter (70%) of nurses didn’t know assessment criteria for hemodialysis fistula, which improved after sessions to be (13.3%). four fifths (83.3%) of nurses didn’t know proper direction of needle placement, which improved after sessions to be (13.3%). One quarter (26.7%) of nurses didn’t know signs of complications of fistula, which improved after sessions to be (0.00%). One half (50%) of nurses didn’t know different types of hemodialysis access, which improved after sessions to be (6.7%). The majority of nurses didn’t know complications of fistula, which improved after sessions to be one quarter ( 23.3%). One half (53.3%) of nurses didn’t know sites of fistula creation, which improved after sessions to be (13.3%).

It was clear from the table that there this significant improvement in nurses knowledge about care of arterio venous fistula between pre test (mean ±SD 6.7667 ± 1.135) and post test (mean ±SD 9.2333 ± 0.626) (P value = 0.05).

**Table (5.3):** Total score of nurses’ knowledge about hemodialysis access care.

Score	Pre test		Post test	
	Frequency	%	Frequency	%
Poor	9	30.0	3	10.0
Average	10	33.3	5	16.7
Good	4	13.3	8	26.7
Very good	4	13.3	9	30.0
Excellent	3	10.0	5	16.7

**Table (5.3):** Nurses' performance about hemodialysis vascular access care.

Items	Pre test				Post test			
	Incorrect		Correct		Incorrect		Correct	
	No.	%	No.	%	No.	%	No.	%
1. Asks the patient to wash his arm.	27	90	3	10	18	60	12	40
2. Wash hands before touching the patient	26	86.7	4	13.3	21	70	9	30
3. Assessing patient skin integrity.	21	70	9	30	12	40	18	60
4. Wear personal protective equipment.	24	80	6	20	18	60	12	40
5. Check fistula by Palpating thrill.	25	83.3	5	16.7	4	13.3	26	86.7
6. Assess presence of edema.	26	86.7	4	13.3	22	73.3	8	26.7
7. Put sterile towel under Pt arm.	24	80	6	20	12	40	18	60
8. Disinfect vascular access.	19	63.3	11	36.7	5	16.7	25	83.3
9. Correct fistula needles placement method.	22	73.3	8	26.7	2	6.7	28	93.3
10. Tapes IV tubing securely.	1	3.3	29	96.7	1	3.3	29	96.7
11. Obtains blood for Pre-dialysis lab.	3	10	27	90	1	3.3	29	96.7
12. Press after needles removal by sterile gauze	7	23.3	23	76.7	2	6.7	28	93.3
Mean score $\pm$ SD	5.4864 $\pm$ 1.435				9.5573 $\pm$ 0.839			
Significance score	(t)test = 10.793				P value = 0.000			

This table showed that majority of nurses (90%) didn't ask patient to wash his or her arm prior start session, which improved after session to be two thirds (60%). Four fifths (80%) of nurses didn't wear personal protective equipment before dealing with patient, which improved after session to be two thirds (60%). About three quarter (70%) of nurses didn't assess patient skin integrity, which improved after session to be two fifths (40%). Four fifths (83.3%) of nurses didn't check efficiency of fistula by palpating thrill, which improved after session to be (13.3%). Four fifths (80%) of nurses didn't put sterile towel under Pt arm, which improved after session to be two fifths (40%). Two thirds (63.3%) of nurses didn't disinfect vascular access, which improved after session to be (16.7%). Three quarters (73.3%) didn't follow correct fistula needles placement method, which improved after session to be (6.7%).

#### Discussion:

Standards of care are essential and first steps for continuous quality improvement. Standards of care communicate clearly to everyone involved in the health care services what level of services is expected in that organization. Without these standards judgments made in the evaluation process may be susceptible to whims and biases of the evaluator<sup>(8)</sup>.

Compliance with nursing care standard in performing invasive procedure is very

important because it prevent complication, prevent spread of infection in hospital, and decrease costs of the patient care and decrease morbidity and mortality rate in hospital. Therefore, nurses share responsibility with other health care personnel for infection reduction in patient across the entire continuum of care and key to reduce risk for infection and complication through a variety of direct care activities. So, it is important to evaluate nurses' knowledge and performance in this critical area<sup>(9)</sup>.

#### Concerning demographic Characteristics of the Study Subjects;

The present study showed that the 30 nurses of this study were young with mean age  $29.5 \pm 2.7$  years and all of them were female. Similar demographics findings support were reported in other studies conducted in different renal dialysis units one study conducted by **Nermin M. (2012)**<sup>(10)</sup> reported that the majority of nurses were young with mean age  $28.9545 \pm 5.4982$ . Sahar S. (2002) reported that majority of nurses were young with mean age  $31.1 \pm 8.24$  years. Also, **Hana E. (2012)**<sup>(11)</sup> reported that the majority of nurses 72.5 % were young with mean age  $29.53 \pm 5.5$  years.

Regarding nurses' educational level, the present study showed that about half of studied nurse (53.3 %) of nurses graduated from nursing school. This was on the same line with **Nermin M. (2012)**<sup>(10)</sup> who reported that 70.5% of studied staff nurses graduated from nursing school. Another finding reported by **Sherein A. (2006)**<sup>(12)</sup> showed that 71.9% graduated from nursing school. In contrast, **Abdelsatir S. (2013)**<sup>(13)</sup> reported that majority of nurses 85% were university graduates.

Regarding Years of experience, the present study showed that more than two fifths of studied nurses (43.3%) had more than ten years of experience with mean  $7.9 \pm 4.614$  years of experience. Similar result was reported in another study conducted in

different renal dialysis units by **Suzette A.(2006)**<sup>(14)</sup> who reported that majority of nurses (88.4%) had 11-15 years of work experience. In contrast, **Suhair A. (2013)**<sup>(15)</sup> reported that 81% the nurses had less than ten years of experience in hemodialysis centers. Also, **Sherein A. (2007)**<sup>(26)</sup> reported that 70.3% of nurses had less than five years of experience.

Regarding vascular access care, delivery of optimal HD requires a well functioning vascular access with a nominal blood flow rate of 400 mL/minute without access recirculation. Failure of access function limits the delivered dose of dialysis which in turn is one of the major determinants of survival on dialysis. Adequate care of hemodialysis (HD) patients is inseparable from the problems of creating and maintaining the patency of vascular access **Held J et al (2002)**<sup>(16)</sup>. Vascular access offer excellent way for bacteria to invade blood stream of patients undergoing hemodialysis **Tokars (J 2000)**<sup>(17)</sup>. The present study showed that majority of studied nurses (83.3%) didn't evaluate hemodialysis access function before connection. It was in the line with **Mona E. (2012)**<sup>(18)</sup>. who reported that 67 % of nurses didn't assess patient before procedures. In contrast, **Soheir A. 2013**<sup>(19)</sup> reported that most nurses (98%) evaluated HD access function before connection . The present study showed that (70%) of nurses didn't assess patient skin color and integrity. **Smith, et al (2004)**<sup>(20)</sup> and **Walsh (2002)**<sup>(21)</sup>, recommended that after the completion of the dialysis, the arterial lines should be clamped and the blood in the dialysis circuit lines should be returned to the patient by saline. Sterile dressings should be applied to the needle site. This finding was supported by **Suhair A.(2013)**<sup>(19)</sup> who reported that 52% of nurses assess fistula for infection. The present study showed that 26.7% of nurses dispose of equipment after use. In contrast, **Tulin I. (2014)**<sup>(21)</sup> report that (90.7%) of

nurses dispose waste from the environment. The present study showed that there was significance improvement in nurses' performance regarding care of hemodialysis fistula. It was supported by **Suhair A. (2013)**<sup>(27)</sup> who reported that there was significant improvement in nurses' performance regarding care of hemodialysis fistula in between pre test 0% and post test 71% . The present study showed that 80% of nurses didn't put sterile towel under site of fistula to prevent cross of infection. This result agree with **Ahmed (2007)**<sup>(22)</sup> who clarifies that no one of the study nurses applies sterile drapes to the upper chest completely.

The findings of the present study showed that two thirds of nurses (30%) had poor knowledge before sessions and (33.3%) had average knowledge score. Similar findings published by **Sherein A. (2007)**<sup>(16)</sup> who reported that 53% of nurses had average score related their knowledge .**Hoda (2004)**<sup>(17)</sup> reported that 95.5% of nurses had poor score related their knowledge. **Samah M. (2009)**<sup>(23)</sup> reported that 20% of nurses had good score related their knowledge before program implementation which improved to be 94% of nurses had good score after program implementation.. **Sharaf et al. (2004)**<sup>(32)</sup>, mentioned that inadequate and incomplete performance of nurses in their work results from inadequate educational preparation. After the implementation of the program, there were significant improvements with the number of participants who achieved an excellent score in these subcategories in the post test. **Janice R. (2011)**<sup>(25)</sup> reported that the mean pre-test score improved from 14.6 + 1.1 to 15.4 + 0.8 post-test; p =0.001. The nurses demonstrated excellent pre-test knowledge. Similar findings reported by **Nermin M.(2012)**<sup>(10)</sup> who reported that who reported that all of nurses had poor score before program implementation which become 61% of nurses had good

score after implementing program. All health care practitioners required to have good knowledge to safely provide patient care (**Smith & Curran, 2003**)<sup>(27)</sup>. **Tyson and York (2002)**<sup>(28)</sup> stated that significant improvement in nurses' knowledge after attending a program emphasized the need of hospital nurses to attend more educational opportunities to strengthen their skills and update their knowledge and improve the quality of care provided to patients. Interestingly, **Mahrous (2007)**<sup>(29)</sup> found that implementation of the standard with minimal education resulted in statistically significant improvements in nurses' knowledge.

Concerning correlation in between nurses' knowledge and nurses' age, the present study showed that there was no relation in between nurses' age and nurses' knowledge. It was supported by **Sherein A. (2007)**<sup>(32)</sup> who reported that no significant relation in between nurses' age and knowledge. Also, **Manal S. (2008)**<sup>(23)</sup>, who reported that no statistically significant relation was found between nurses knowledge and nurses' age . These findings are consistent with **Ahmed (2007)**<sup>(5)</sup> and **Gad Allah (2007)**<sup>(13)</sup> who found that no statistical significant relation between nurse's level of knowledge and their age. In contrast **Abdel lateef (2003)**<sup>(2)</sup> reported that age factor didn't affect level of nurses knowledge.

Regarding correlation in between nurses' knowledge and their educational level, the present study showed that no significance revealed, P value was 0.346. This finding was supported by **Sherein A. (2007)**<sup>(32)</sup> reported that no statistically significant relationship between nurses' knowledge score and their educational level ( $p > 0.05$ ). In contrast **Mona E.(2012)**<sup>(25)</sup> who reported that there was significance between nurses' knowledge and their educational level, She reported that knowledge was improved after sessions among nurses who had nursing

diploma . **Abd El-Aziz (2003)**<sup>(18)</sup>, found that there is no statistical significant relation could be shown between nurse's level of knowledge and qualifications. Nevertheless, these results disagreed with **Attia (2001)**<sup>(19)</sup>, who mentioned that a statistical significant correlation is found between total nurse's knowledge and qualifications.

Regarding correlation in between nurses' knowledge and years of experience in hemodialysis unit , the present study showed that no significant relation in between nurses' years of experience and their level of knowledge  $p < 0.05$  . It was supported by **Sherein A.(2007)**<sup>(10)</sup> who reported that no significant relation in between nurses' years of experience and their level of knowledge  $p < 0.05$ .

Regarding correlation in between nurses' knowledge and performance, the present study showed that there was no statistically significant relationship between nurses' performance score and their knowledge score ( $p > 0.05$ ). These findings was in the line with **Tulin I (2014)**<sup>(25)</sup> who reported that there was no statistically significant relationship between nurses' skill score and their knowledge score ( $p > 0.05$ ).Also, **Duruk, N., 2007**<sup>(19)</sup> who reported that there was no statistically significant relationship between nurses' skill score and their knowledge score ( $p > 0.05$ ). In contrast, **Hoda M. (2014)**<sup>(33)</sup> reported that there was significant relationship between nurses' performance score and their knowledge score as he stated that all nurses who had unsatisfactory practice and poor knowledge before implementation the educational program, immediately after implementation the program had good practice and good knowledge score. **Tantaway (2004)**<sup>(39)</sup> reported that that most of nurses have inadequate performance in relation to nursing care procedures. This finding was in line with **Chan (2002)**<sup>(32)</sup>, who found no significant

relations between nurses knowledge and performance. Moreover, agreed with **Abd El-Aziz (2003)**<sup>(11)</sup>, who showed that there is no statistical significant correlation between nurse's level of knowledge and practices. On the contrary, **Ahmed (2007)**<sup>(31)</sup>, was found highly significant difference between nurse's level of knowledge and level of practice. In the same line **Attia (2001)**<sup>(9)</sup>, found that there was a significant difference between subtotal practices and level of nurse's knowledge. Lastly, knowledge alone without performance has no effect.

**Conclusion:**

In the light of the present study findings, it can be concluded that:

- Nurse's level of education and years of experience was positive correlation with their knowledge and performance, but it was not statistically significant.
- There is an increasing need to introduce effective education programs to current patients in order to enhance and update their knowledge.

**Recommendation:**

Based upon findings of the present study, the following suggestions are recommended :

- Evaluation of nurse's performance in hemodialysis unit should be done periodically and continuously to improved quality of their knowledge
- Procedures manual handbooks containing necessary information related to all nursing procedures rendered to patients in hemodialysis unit should be in Arabic language, available and easily used.
- Creative strategies should be designed to decrease nurses' workload e.g. decrease non nursing activities.

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