

Ragaa A. El-Aziz, ** Dr. Eglal Ahmed Abd El Whab***, Dr. Sanaa Mohamed Aref *

M.sc.Nursing Administration**

Professors of nursing administration

** (1) Faculty of Nursing, Cairo University**

*** (2) Faculty of nursing – Minia University***

Abstract

Background: Patient safety is the cornerstone of high-quality healthcare. Hemodialysis units are complex organizations that involve providers from multiple disciplines. Nursing interventions have a great impact on reducing the risk for complications of hemodialysis patients. Aim: develop, implement and evaluate patients' safety guidelines for nurses at hemodialysis units in Ministry of Health Hospitals at Beni-Suef Governorate. Research design: -Methodological and Quazi experimental was used in this study. Setting: This study was conducted in Ministry of Health Hospitals at Beni-Suef Governorate. All staff nurses in hemodialysis units were included the study sample study, it composed of (45) nurses. Tools: two tools were used in the study A) Observation checklist and B) Patient safety guidelines. Results the total mean scores of nursing performance was 178.06+49 before implementing guidelines program which it became the highest total mean scores was 280.02+35.5 after the implementation of guidelines for hemodialysis units. Conclusions: The developed patient safety guidelines for nurses in hemodialysis units had a positive effect on nurses' performance in ministry of Health and Population's Hospitals in Beni-Suef Governorate. Recommendation Increase and well-organize in-service training program on hemodialysis units including the newly developed standard patient safety guidelines, Developed program and its booklet should be applied in all similar settings in Beni-Suef as a step for wider application in other governorates .

Key words: hemodialysis, nurses, patients' safety, Guidelines.

Introduction

Patient safety is the keystone of a high quality of healthcare. Much of work defining patient safety and practices that stop harm have focused on undesirable outcomes of care, such as morbidity and mortality 1. Nurses are essential to the surveillance and coordination that reduce such adverse outcomes. Multiple safety risks are readily apparent in dialysis units such as water quality, infection control, inadequate hand hygiene, and faulty machine and equipment disinfection 2. So improving the culture of safety in dialysis units is an essential requirement for minimizing patient risks for harm, preventing or reducing errors, and improving the quality of care rendered .

Hemodialysis units are complex organizations that involve providers from multiple disciplines and the use of advanced technology to care for patients with multiple serious illnesses. Nurses routinely perform hemodialysis treatment but risks can be ever-present. In hemodialysis settings, infection control measures according to standard precautions are recommended due to the increased potential for contact with blood and bloodborne pathogens 3

Patient safety guidelines in dialysis Settings should be applied in hemodialysis unit with all other good practice guidelines which are relevant to maintaining safety in hemodialysis unit, These focused on developing a set of standard principles for Protection against blood-borne infections in dialysis settings 3, infection control precautions that should be applied by all health care practitioners to ensuring safety of patients and staff the infection control practices recommended for hemodialysis units and the standard precautions are including ,environmental hygiene, hand hygiene, use of personal protective equipment and the use and disposal of sharps ,disinfection of surfaces ,cleaning

of environment disinfection of hemodialysis machines .water treatment system, and vascular access care. 4

Hemodialysis nurses play an essential role in ensuring adherence to the hemodialysis standards and to provide effective and safe patient care. Nurses provide this important clinical care ensuring that they maintain an appropriate standard whilst also taking action to obtain an appropriate standard of care from other professionals when necessary. Nurses need to ensure they provide a high standard of hemodialysis practice by delivering safe and effective patient care in a supportive and comfortable environment 5

Significance of the Study

By researchers' own it was observed randomly during presence in clinical train of students that hemodialysis nurses in Ministry of Health at Beni-Suef Governorate, noticed that some nurses do not adhere to aseptic techniques prior to arteriovenous needle insertion. Moreover, some nurses do not monitor vital signs on an hourly basis, or this would affect the level of quality of care given to the patient receiving hemodialysis. Nurses need to ensure a high standard of hemodialysis practice by delivering safe and effective patient care in a supportive and comfortable environment 4,5. There must be a clear identification of the skills and knowledge required by the nurse in order to carry out patient care effectively. Therefore, there is a need to developed guidelines to evaluate applying safety measures during caring patient at hemodialysis units in Ministry of Health Hospitals at Beni-Suef Governorate.

Aim of the study:

The aim of this study was to develop, implement and evaluate patients' safety guidelines for nurses at hemodialysis units in Ministry of Health Hospitals at Beni-Suef Governorate.

Research Question:

- Q1. Are staff nurses applying safety measures during patient's care in hemodialysis units?
- Q2. Are staff nurses applying infection control and standard precautions in hemodialysis units?

Methodology

Research design:

Methodological design and Quasi experimental were utilized to fulfill the aim of this study.

Setting:

Study was conducted in Ministry of Health Hospitals at Beni-Suef Governorate.

Sample:

All staff nurses in hemodialysis units were included the study sample, 30 nurses from Beni-Suef General Hospital and 15 nurses from Nasser Central Hospital.

Tool of data collection:

Two tools used for collecting data for this study tools as follow:

Tool one:

Part 1. Nursing staff interview: An interview will be developed to identify, Personal data of the nursing staff, e.g., age, gender, marital status, qualification, years of experience, at hemodialysis units.

Part II. Observation checklist for Nurses:

This tool was developed by (Hassona, Winkelman, Abd El- Wahab, Ali &Abdeen, 2012). It used to assess nurses performance in hemodialysis units. It included three phases:

- Predialysis phase. The nurse collects all equipment (10 items), prepares the patient (15 items), and prepares the machine (23 items).
- Intradialysis phase. The nurse prepares herself for dialysis (8 items), The nurse prepare the patient (38 items).
- Terminating dialysis. The nurse terminates the dialysis session and prepares the patient for departure (13 items).

Scoring, The items observed to be done correctly were scored "3" and the items not done incorrectly done were scored "2", items not done were score "1", the scores of the items were summed up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score. The practice was

considered accepted the percent score was 60% or more and not accepted if less than 60%. Scoring system for Nursing Practice Checklist.

Tool two

Guidelines regarding safety measures

Guidelines was designed by the researcher in an Arabic language form based upon Ministry Of Health, relevant literature, previous studies, available resources, and the actual need assessment of nurses in hemodialysis unit about applying patients' safety measures in hemodialysis units.

Safety Guidelines in hemodialysis units which included the following parts:

Part I : Concept of patient safety two items, Principle of patient safety (9) items, national of patient safety goals(6) items, component of patient safety(8)items, safety culture(13)items.

Part II:(2) items, description of dialysis work(2) Items role of the nurse in hemodialysis unit (12) items, care of the catheter before starting the dialysis process (8)items. use of appropriate personal protective equipment (11),items.

Part III: Guidelines for preparation equipment's(5)items, safety guidelines in pre-dialysis (17) items, safety guidelines during dialysis (23),items, safety guidelines in terminating dialysis (12),items .

PartIV: Guidelines in general hygiene (environmental cleaning, disinfection),(8) items, safety devices and technology (7)items, cleaning and disinfection of specific environmental surfaces(6),cleaning and disinfection of auxiliary equipment (4)items, safety guidelines for safe handling of clean, contaminated bed sheets and covers(6)items

PartV: safety guidelines for blood or body fluids spills (9) items, safety conditions and specifications of waste storage container (4)items, documentation(11) items .

Part VI: Summarize staff vaccination (4)items, Summarize patient vaccination items (5) ,safety guidelines for prevention infection in hemodialysis units (18)items .

Field work

The actual fieldwork for the process of data collection has consumed six months started at the beginning of December 2016 till the end of May 2017.

Content Validity

Validity of the developed patient safety guidelines was done by expertise opinion members, professional professor of medical-surgical nursing at Ain Shams University, lecturer of medical-surgical nursing at Beni-suef University and lecturer of nephrology at the faculty of medicine at Beni-Sue University for clarity, feasibility, applicability, and appropriate modification was done .

Pilot Study:

A pilot study was carried out. It included five nurses, which represented 10% from total sample size, three nurses from the General hospital and two nurses from Central Nasser hospital. The pilot served to test the clarity

and feasibility of the observation checklist. It helped in making necessary changes in the tools based to detected data collection problems or difficulties. As a result of the pilot study, some items were omitted and other were added ,and some unclear items were reword.

Administrative Design:

A written initial approval was obtained from the Research Ethical Committee at the Faculty of Nursing, Minia University. Another official approval for conducting the study was obtained from the director of Faculty of Nursing, Minia University followed by an official approval from Director of Health Directorate at Beni-Suef Governorat

Ethical Consideration:

The ethical research considerations in this study included the following items

- A written initial approval was obtained from the research ethical committee at the Faculty of Nursing, Minia University
- Individual oral consent was obtained from each participant after explaining the nature and benefits of the study. and the anonymity and confidentiality were also assured.
- The researcher cleared the objective and aim of the study to participants.

Developed guidelines

Assessment of nurse's needs of hemodialysis units, the objective of this assessment is to evaluate the need of hemodialysis nurses for practice guidelines through assessing their performance in pre, during and post hemodialysis.

Construction of nursing practice guideline:

The nursing guidelines were developed according to the results of the assessment of nurses need and pre-implementation of nursing guideline in hemodialysis units by using observation sheet . The guidelines was consisted of hemodialysis nursing procedure (pre-during and post hemodialysis practices) and infection control at hemodialysis units (hand wash, wear personal protective equipment and dialysis machine and units beds cleansing). It was revised by Jury of three experts ,medical doctors from hemodialysis unit and two professor in the Medical. Surgical nursing department at the Faculty of Nursing , they modification was done about rewording some point. total time needed for observation for nurses was taking average two hours per day. official approval from Director of Health Directorate at Beni-Suef Governorat to explain and applying patient safety guidelines for nurses in hemodialysis units.

Implementation of patient safety guidelines:

After gathering the initial information and determining the deficits of nursing staff in hemodialysis unit from pre-program assessment , informs staff nurses about guidelines the program was implemented over a three week period, It was implemented for two groups the first group at ,Beni- Suef General hospital and the second group at, the Nasser hospital . The number of nursing depend on working circumstances, and nurses physical . The total program hours were 14 hours divided by three days every two hours except the second and three session were spent three hours ,guidelines prepared to nursing staff via explaining them in six sessions, including periods of discussion according to nurses achievement , progress, and feedback .The investigator was available by rotation three days per week . then the researcher starts explain the aim of the program and dividing contents , the first session, orientation of the program and introduction about concept, principles ,and component of patient safety in hemodialysis unit. Simple words and Arabic language were used to suit the nurses level of understanding . Feedback was given at the beginning of the session about the previous one, during the program the nurses received handouts patient safety guidelines booklet.

Evaluation after implementing of patient safety guidelines

After implementing of safety guidelines, observation of nursing for patient safety was administered to assess participating nurses performance about patient safety in hemodialysis units. by the investigator using nurses' performance checklist after implementing of safety guidelines .The investigator collected the intervention data by using the same forms before implementing of safety guidelines. This helped to evaluated the effect of the implemented guidelines .This was done immediately after the intervention.

Statistical designs:

The collected data were organized, analyzed using appropriate statistical significant tests. The data were collected and coded. Using the Computer Statistical Package for Social Science (SPSS), version 21, the statistical analysis of data was done. Data were presented using descriptive statistics in the form of frequencies and percentages. Chi-square, t and person correlation tests were used to compare the frequencies in two groups and correlation between study variables. Probability (p-value) is the degree of significance and if it less than 0.05 was considered significant, the smaller the p-value obtained, the more significant is the result (*), less than 0.001 was considered highly significance (**) and the correlation coefficient was done by using Spearman rank correlation .

Results

Table (1) Mean scores of nurse's performance in hemodialysis regarding to the three phases before and after implementation Guidelines

Variables	Before implementation Guidelines			After implementation Guidelines			T	P
	Mean +SD	Max score	$\bar{x}\%$	Mean +SD	Max score	$\bar{x}\%$		
Pre phases	77.53 ±21.11	132.00	77.8 (NA) 22.2(A)	124.7 13.53±	142.00	93.3%(A) 6.9%(NA)	13.61	0.000**
Intra phases	77.57 ±22.88	131.00	77.8 (NA) 22.2(A)	120.68 ±18.7	120.68	88.9%(A) 11.1%(NA)	9.93	0.000**
Termination phases	22.95 ±7.18	39	80%(NA) 20%(A)	34.60 ±6.86	39.00	86.7%(A) 13.3%(NA)	8.20	0.000**

** Highly Significant at $p < 0.01$ Acceptance(A), Non acceptance (NA)

Table (1) reveals that studied subjects of the mean performance score was that in pre dialysis phases and, Intra dialysis phases the total mean score was 77.53± 21.11 that equal, 77.8% not accepted and 22.2% accepted while in Termination phases the total mean score was 22.95±7.18 that equal 80% not accepted and 20% accepted before implementing safety guidelines . Moreover that studied subjects of the mean performance score became the highest percent after the implementation of guidelines , the mean

score was in pre dialysis phases 124.7± 13.53 that equal the mean percentage 93.3% accepted performance and 6.9% not accepted , Intra dialysis 120.68±18.7 that equal the mean percentage 88.9%accepted and 11.1% not accepted , in termination phases 34.60±6.86 that represent the mean percentage13.3% not accepted and 86.7% accepted performance after implementation of the safety guidelines for hemodialysis unit.

Table (2)Correlation between Socio-demographic Characteristics& total Nurses' Performance before implementation Guidelines among staff nurses (N=45)

	Preparation phase		Intra phase		Termination phase		Total performance	
	r	p	r	p	r	p	r	p
Age	.511	.000**	.519	.000	.467	.001	.533	.000**
Level of education	.106	.487	.151	.322	.089	.563	.135	.377
Length of time posted in hemodialysis unit	.318	.033*	.306	.041	.243	.108	.311	.037*

** Highly Significant at $p < 0.01$

Table (2) shows that studied subjects before implementation of safety guidelines ,it had found highly statistically significant correlation between age and three phases of total performance. Moreover It had found

statistically significant correlation between ,Length of time posted in hemodialysis unit, presence of patient safety guidelines

Table (3) Correlation between Socio-demographic Characteristics& total Nurses' Performance after implementation Guidelines among staff nurses (N=45)

	Preparation phase		Intra phase		Termination phase		Total performance	
	r	p	r	p	r	p	r	p
Age	.239	.179	.829	.033	.497	.104	.492	.105
Level of education	.396	.130	.229	.130	.262	.171	.205	.176
Length of time posted in hemodialysis unit	.302	.044	.269	.074	.206	.174	.296	.048*

Table (3) reveals that studied subjects after implementation of safety guidelines ,it had found had a statistically significant correlation between length of time

posted in hemodialysis unit and three phases of total performance.Also it had found strong positive correlation between age and three phases .

Discussion

Regarding the total score of nursing performance results in the before and after implementation of Guidelines

The present study finding illustrated nurses' performance was not accepted in pre-implementation of guideline as determined by mean of score in majority of items. This result could be due to absence of protocols or guidelines. The present study findings, showed that in pre dialysis phases and, Intra dialysis phases the total mean score was 77.53 ± 21.11 that represent the mean percentage, 77.8% not accepted and 22.2% accepted while in Termination phases the total mean score was 22.95 ± 7.18 that represent 80% not accepted and 20% accepted before implementing safety guidelines. Moreover that studied subjects of the mean performance score became the highest percent after the implementation of guidelines, the mean score was in pre dialysis phases 124.7 ± 13.53 that represent the mean percentage 93.3% accepted performance and 6.9% not accepted, Intra dialysis 120.68 ± 18.7 that represent the mean percentage 88.9% accepted and 11.1% not accepted, in termination phases 34.60 ± 6.86 that represent the mean percentage 86.7% accepted and 13.3% not accepted performance before implementation of the safety guidelines for hemodialysis unit. However, after implementations patient safety guidelines it had observed the improvement of mean score among the three phase (pre, intra and termination dialysis phases). This findings may be reflect effectiveness of patient safety guidelines after its implementation of the safety guidelines. The finding of the present study agreed with the study done by Gracias et al. (2008)⁶ who investigated that the nurse practitioners compliance with clinical practice guidelines and they found an increase in their performance and in patient quality of care. Moreover, the current study congruent with the study of Kim, Chun, and Park (2012)⁷ who also developed an educational program for hemodialysis nurses in Korea and revealed that the developed program had a positive effect on the hemodialysis-specific knowledge, plus levels of self-satisfaction and efficacy among hemodialysis nurses. Also, the study of Ahmed (2011)⁸ who investigated the effect of designed nursing protocol on nurses practice regarding hemodialysis and revealed a positive effect of the designed standard nursing practice guidelines on nurses practice. However, the finding of the percent study not similar, with the study of Hassona, Winkelman, Abd El-Wahab, Ali, and Abdeen (2012)⁹ studied the effect of standard nursing care practice for Dialysis unit system, nursing staff and reported its effectiveness in increasing their performance after standard implementation

Statistical Relation and Correlations between socio-demographic and Nurses Performance before and after implementation safety guidelines

Regarding the relation between three phases of nurses performance and their demographic characteristics there was shows statistical significance positive correlation between age and total score of performance before implementation safety guidelines among studied nurses and it observed strong positive correlation between age and total score of performance after implementation safety guidelines. This could be related to older years in the field could contribute to a better performance, age group and nursing performance can be directly contributing socio-demographic characteristics to safety culture by nursing personnel. The

finding is consistent with the view of. The results consistent with the study of Al-Mawsheki et al. (2016)¹⁰ who revealed a significant difference between age and nursing practice level among studied nurses. Also agree with the study of Mohamed (2008)¹¹ who assessed nursing performance and revealed a significant relationship between age and nursing performance among studied nurses. These results agreed with, Al-Hakkak's (2004)¹² who presented that there was a significant relationship between nurses' practices and their age. Furthermore in a similar study, Abdelfatah & Mohamed (2013)¹³ showed that there is statistical significance difference between age of studied nurses and level of the practice with p value (0.001). This may be related to older nurses depend on younger nurses in work and they prefer to play administrative role only. Also, Said, (2004)¹⁴ who found that higher rates of nurses who had satisfactory level of performance existed among the older age of nurses. However, The present study result disagreed with Ali, 2011¹⁵ who stated that the young aged nurses, who is more active, initiative, has good physical fitness and creative in achieving the nursing performance. Also, This result was disagreed with Ali T. Shnishil (2017)¹⁶ in University of Baghdad, Iraq who presented that there was no significant association between nurse's practice and their age in pretest and implementation guidelines

Regarding the relation between three phases of nurses performance and their years of experience in hemodialysis unit, there had a statistical significant correlation between length of time posted in hemodialysis and three phases of total nurses performance before and after implementation patient safety guidelines. This might be related to the fact that performance become better with increased experience. This is consistent with the study of Al-Mawsheki et al. (2016)¹⁰ who reported a significant relation between years of experience and nurses performance regarding hemodialysis units. Also these results were agreement with Abdelfatah (2013)¹³, who stated that there was statistical significant difference between nurses practice scores and age of studied nurses and years of experience.

Regarding the relation between three phases of nurses performance and level of education, there were not statistical significant correlation between nurses performance and nursing education level before and after implementation safety guidelines. This result was agreed with Ali T. Shnishil (2017)¹⁶ who indicated that there was no significant association between nurse's practice and their nursing education level. However, A study done by Aiken, (2011)¹⁷ indicate that the increase in the proportion of nurses with higher educational and improve care. This result was disagreed with Ahmed et al. (2013)¹⁸ who revealed a significant relation between in-service education and commitment with practice guidelines with the overall patients' safety outcomes.

Conclusion

There was an improved in nurses performance of Ministry Of Health in hemodialysis units after implementation of patient safety guidelines in relation to before its implementation.

Nurses age and experience in dialysis unit had statistical significant relation with their performance.

Recommendations

Based on the findings of the current study it was recommended that:

- Insure the adherence of nurses in hemodialysis units to developed through , booklet of patient safety guidelines available for each nurse, effective supervision and effective evaluation for nurses performance
- Refreshment of training courses regarding patient safety obligatory to nursing staff.
- Continuous evaluation of nurses in hemodialysis units as a method of forcing self-maturation trough education and gaining new knowledge related to their working field.
- Hospitals' administration must provide all equipment and supplies that enable the nurses to implement the standard precaution.
- The developed program and its booklet should be applied in all similar settings in Beni-Sueif as a step for wider application in other governorates.

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