
Improving the Quality of Nursing Care for Patients with Leukemia in Day Care Units Through Nursing Education

Sahar Ahmad Shafik¹, Eman Shokry Abd Allah²

¹Community Health Nursing, Faculty of nursing, Helwan University, Egypt

²Community Health Nursing, Faculty of nursing, Zagazig University, Egypt

Email address:

dsahar 100 @ yahoo.com (S. A. Shafik)

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Abstract: Quality of nursing care is a vital element in the treatment of the patient with leukemia in day care units. The aim of study was to test the effect of nursing education for quality of nursing care for patients with leukemia in day care units. *Design:* A quasi-experimental design was used in this study. *Setting:* The study was conducted at Day Care Unit Clinic for patients with leukemia at University Hospital and the Clinic Oncology Department (Cobalt unit). *Sample:* A sample of purposive of all nurses is (n=50) and 10% of patients is (n=50) with leukemia were recruited for the study. *Tools:* Data was collected through: (1) An interviewing questionnaire to assess nurse's knowledge and patient's satisfaction regarding the quality of nursing care. (2) An observational checklist to assess day care units and nursing performance. *Results:* the majority of nurses had poor knowledge about leukemia. Besides, they don't follow a standard of quality of nursing care related to the disease of leukemia. Furthermore, most of the facilities were unavailable in the day care units and about three quarters of patients were not satisfied with the quality of nursing care. The implementation of the nursing education program has improved nurse's knowledge, performance and patient's satisfaction with statistically significant differences ($p < 0.001$). The study has concluded that the nursing education program has improved nurses' knowledge and performance concerning the disease of leukemia, and patients were also satisfied with the quality of nursing care. *Recommendations:* Continuing educational program to keep nurses updated in their knowledge and performance regarding the quality of care, a simple Arabic illustrated booklet for discharge instructions should be available in hematology units as a reference for patients. And additional research is needed to assess the long-term effects of such educational program.

Keywords: Leukemia, Quality of Care, Nursing in Day Care

1. Introduction

Leukemia is a rapidly progressive cancer of the white blood cells. Normal white blood cells are produced in the bone marrow to fight infections. In leukemia, the bone marrow produces a large number of abnormal white blood cells (Belal & Hotfilder, 2001). This affects the development of patient's normal blood elements and can have serious clinical consequences including life-threatening problems with infection and bleeding. There are two main types of acute leukemia, each named after the type of cell that is affected: Acute Myeloid Leukemia and Acute Lymphoblastic Leukemia (Baron, & Daoust, 2011).

Leukemia requires timely intervention with specialized chemotherapy. Treatment is characterized by length and hospital admission for intensive chemotherapy regimens

followed by frequent outpatient clinic visits for monitoring, blood product support and additional treatment (Burke, & Megan, 2010).

The National Cancer Institute estimated that (n= 47,150) people will be newly diagnosed in United States and (n= 23,540) people will die from leukemia in 2012. The incidence rates of leukemia per 100,000 populations are almost identical for data reported in 2008 and 2009 (leukemia 12.2, 2009 vs. 12.3, 2008). An estimated (n=34.810) new cases of leukemia occur annually, slightly more than half of this number are Acute Leukemia and less than half are Chronic Leukemia. Estimated new cases are approximately (n= 44,270) and estimated deaths of Leukemia are approximately (n= 21.710) (WHO, 2011).

Quality of nursing care is the degree of which health care for patient increases the likelihood of desired outcome and consistent with current professional knowledge (Mains, & Andaleeb, 2006). It is the degree or grade of excellence with respect to medical and nursing services perceived by the patient, administered in terms of technical, competence appropriateness, acceptability, humanity and structure (Wikipedia, 2011).

A Day care unit is any medical care delivered on an outpatient basis. Many medical conditions do not require hospital admission and can be managed without admission to a hospital. Medical care include diagnosis, observation, treatment and rehabilitation, that is provided in day care unit. On the other hand there are some medical investigations that can be performed on day care unit including blood tests, X-rays, endoscope and biopsy procedures of superficial organs (Chambers et al ; 2009).

1.1. Significance of the Study

Approximately 245,000 new cases of leukemia are diagnosed every year and approximately 21,840 death cases in the united states (Oncology Channel,2011), and in Egypt, the incidence of leukemia was reported 30% in 2008, while in 2010 it was 44.6% of Egyptian population (WHO.2011).

Nursing care for patients with leukemia in day care units, not only provides nursing care, but also focuses on providing complex care for patients such as: preparation, giving chemotherapy drugs, management of acute and chronic leukemia and psychological support for patients with leukemia. Also nursing practice, with nursing role in community health nursing , involves the same primary, secondary, and tertiary prevention focused on nursing care (American Nurses Association . 2010) .

The present study aim: to test the effect of nursing education for quality of nursing care for patient with leukemia in day care units through:

1. Assessing nurse's knowledge and performance in relation to quality of care to detect their needs.
2. Patient's satisfaction regarding the quality of nursing care.
3. Planning and implementing the nursing education program according to nurses' needs and patient's satisfaction.
4. Evaluating the quality of nursing care improvement according to their knowledge, performance and patient's satisfaction.

1.2. Hypothesis

Nursing educational program will improve knowledge and performance of nurses and patient's satisfaction regarding quality of nursing care.

1.3. Subject and Methods

Design: A quasi- experimental design has been utilized in this study.

Setting: The study was conducted at Day Care unit clinic

for patients with leukemia at Zagazig University Hospital and the Clinical Oncology Department (Cobalt unit) .It consists of six rooms; three for males and three for females. Every room consists of 4 beds and it works every day from 8.00 am - 8.00 pm.

Sample: A sample of purposive consisted of two groups: The first group included all nurses (n= 50) collected from the above mentioned setting, under the following inclusion criteria: age of nurses ranged between 20 > 40 , experience years of nurses ranged 1-10 years . Data was collected in the morning shift.

The second group included 10% of the patients were chosen randomly, their number (n=50) from total number of patients (500). With leukemia patients recruited from the previously mentioned setting, under the following inclusion criteria: Patient's age ranges between 20 - 40 from both gender males and females, and health status free from other health problems of chronic diseases.

1.4. Tools Used for Data Collection

Two tools were developed and used by the two researchers to collect necessary data from the participants:

Tool (I):

A structured interviewing questionnaire was developed by the researchers composed of three parts:

1st par: Socio demographic characteristics for nurses and their patients including age, sex, marital status, qualifications and training about Leukemia etc.

2nd part: Assessment of Nurses' Knowledge. Nurses' knowledge about leukemia, including meaning of Leukemia, causes, manifestations, types and types of treatment. As well as consisted of complication of chemotherapy on body system as gastrointestinal, hematological, respiratory, cardiovascular, immunological, urinary ,musculoskeletal , integumentary system etc. This part used before and after implementation of nursing education program to evaluate the effect of the program.

This part also collected data related to normal average rate of investigation for patient with leukemia , as blood tests consist of (white blood cells, red blood cells , platelets count ,prothrombin time, blood glucose , bone marrow biopsy etc), as well as other investigation used in diagnosis of leukemia as (chest x-ray , CT scan . ECG, urine analysis, and stool analysis).

The 2nd part deal with nurse's knowledge about giving health instructions for patients with leukemia, who suffer from disturbance of respiratory, gastrointestinal, cardiovascular, urinary and integument etc) This part used before and after implementation of nursing education program to evaluate the effect of the program.

Scoring system for nurse's knowledge about leukemia, related to leukemia disease, the responses are scored ranging from 5 to 10. Nurse's knowledge was considered good if the percentage was ≥ 60 %, while nurse's knowledge was considered (average) if the percentage was 50 %, and nurse's knowledge was considered (poor) if the percentage was < 50%.

Tools (II): Observational checklist including two parts:

1st part: Assessment for nursing performance in day care units.

Nursing process: 1) Nursing assessment included: Integument, respiratory gastrointestinal, genitourinary, neurological, cardiovascular, musculoskeletal, immunological, hematological systems 2) Nursing diagnosis 3) Planning and implementation. 4) nursing evaluation

Nursing performance, according to nurses' performance: Item as vital signs (measurement of axillary's temperature, pulse and blood pressure), administration of medication, (oral medication, and IV therapy), blood transfusion and measuring weigh.

Scoring system for assessment of nursing performance related to disease of leukemia .The responses are scored either 1 or 2, (2) (Done) answer and (1) (Not done) answer. The nursing performance was considered done if the percentage was 60% or more and not done if the percentage was less than 60 %.

N.B: Observation checklist filled by investigator.

2nd part: Variation of standard of nursing care in day care units. It was consisted of availability of supplies and equipment.

Scoring system for Variation of standard of nursing care in day care units ,The responses are scored either 2 to 1 ,(1) Not available ,and (2) for Available.

2. Operational Design

2.1. Preparatory Phase

This phase included reviewing the available literature and the different studies related to disease of leukemia to cover various aspects of the research problem using books, articles, magazines, and internet to develop the study tools for data collection

Validity:

The study tools were tested for validity by 5 experts; 2 from the Faculty of Medicine (Clinical Oncology Department) and 3 from the Faculty of Nursing (Community Health Nursing Department).

Pilot study:

A pilot study was carried out on 10% (5 nurses and 5 patients) of the study sample to test tools for clarity, applicability and the time required for filling in the tools. Data obtained from the pilot study was analyzed and accordingly the necessary modifications on the study tools were done; those who participated in the pilot study were excluded from the main study sample.

Field work:

- The actual field work was carried out from the beginning of January, 2014 until the end of August, 2014 in the previously mentioned setting.
- An official approval to carry out the study was obtained from the directors of University Hospitals and Clinical Oncology Department (Cobalt unit).
- The average time consumed to fill in the tools was 45

minutes and 15 minutes for observation checklist.

2.2. Nursing Intervention Construction

The nursing intervention was constructed in four phases:

Assessment phase: In this phase the researchers collected the following data:

Demographic data of the patients and nurses.

- Nurses and their patients' knowledge about leukemia.
- Nurse's performance during care for patients with leukemia.
- Daily care unit facilities.
- Patient's satisfaction regarding quality of nursing care.

2.3. Planning Phase

Based on the results obtained from the assessment phase, the nursing education intervention was designed by the researchers.

General objective: The nursing education program was designed to improve knowledge and performance in accordance with quality of care and patient's satisfaction.

Content: The nursing intervention consisted of details about meaning of the disease, causes, manifestations, types and complications on body system .Besides, Knowledge regarding to normal range rate and laboratory investigations in Day Care Unit.

2.4. Implementation Phase

The nursing education program was implemented over 8 months, it was carried out in 5 sessions; 3 sessions for theory and 2 sessions for practice. The duration of each session ranged between 20-30 minutes.

The nursing intervention was implemented either individually or in groups from 2 to 4 nurses and their patients. At the beginning of each session, the researchers started by a summary about what was given through the previous session and objectives of the new one, taking into consideration using simple and clear language to suite the nurses' as well as the patient's educational level.

Different teaching methods were used including small group discussion, lectures, brainstorming and demonstration. The teaching aids used were brochures, colored posters, and laptop screen show. At the end of each session, the nurses and patients were informed about the content of the next session and its time.

Evaluation Phase: The nursing education program was evaluated through post test; by using both tools the same of pretest forms that were conducted immediately after implementation of program, by comparing the change in nurses' knowledge and performance with patient's satisfaction.

Firstly, the investigator visited the selected settings regularly for 3 days weekly on Sundays, Tuesdays and Thursdays in the morning shift from 9.00 am to 1.00 pm, for 8 months started from the beginning of January, 2013 to the end of August, 2013.

3. Administrative Design

Official letters were issued from the Faculty of the Nursing, Zagazig University Hospital to the administrators of the selected health settings explaining the aim of the study and asking their permission for data collection and participation of nurses and patients in research process.

3.1. Ethical Considerations

The agreement of the subjects to participate in the study was taken verbally and that of the administrators of the selected settings through formal letters. Participants were assured that the information that was taken from them would be treated confidentially and used for the research purpose only. The approval of the Ethics committee of college and university hospital was taken for agreeing to hold Researrch.

3.2. Limitation of the Study

Difficulty in conducting the training sessions during the working hours, which necessitates from the researcher to wait mostly till the end of the working day, which led to prolongation of the duration of nursing education program implementation .

Unavailability of suitable place for conducting the training sessions, and difficulty in implementing the nursing education program in an unequipped training room.

4. Statistical Design

Data was analyzed using the statistical Package for Social Sciences (SPSS) version 20. The first part of data was descriptive data, which were revised, coded, tabulated and statistically analyzed using the proportion percentage, arithmetic means, standard deviation, and range. The second part of data dealt with relation between different variables. The mean and standard deviation of the total score were calculated.

- The arithmetic mean (X) as an average describing the center tendency of observation.
- The standard deviation (SD) as a measure of dispersion of the results around the mean.
- Correlation study (r).

Degrees of Significance of the results were:

Non significant (NS), if $p > 0.05$

Significant (S), if $p < 0.05$

Highly Significant (HS), if $p < 0.01$

Reliability knowledge nurse & patients Alpha = .9597

Reliability practice nurses Alpha = .9267

Reliability practice patents Alpha = .9632

5. Result

Table (1): Shows that the main age of the nurses in day care units was 32.125 ± 7.546 and 42.0 % of them were in the age group of 30 - < 40 years. Regarding gender, 72.0% Of the study sample were females, 32.0% of them had nursing diploma, 56.0% of them were married, 52.0% of them had

from 5 - < 10 years of experience in hematology units, while 58.0% of them didn't receive any training courses.

Table 1. Distribution of the nurses working in day care units according to socio-demographic characteristics (n=50).

Age (in years)	No	%
20 < 30	18	36.0
30 < 40	21	42.0
40 +	11	22.0
Mean \pm SD	32.125 \pm 7.546	
Gender		
Male	14	28.0
Female	36	72.0
Educational level		
Nursing diploma	16	32.0
Specialization diploma	7	14.0
Technical institute	15	30.0
Bachelor of nursing	12	24.0
Marital status		
Married	28	56.0
Single	22	44.0
Years of Experience in hematology unit		
1<5	20	40.0
5<10	26	52.0
10 +	4	8.0
Mean \pm SD	6.24 \pm 4.20	
Training about leukemia		
Yes	21	42.0
No	29	58.0

Table (3): Represents the mean of nurses' knowledge regarding to leukemia disease at pre/ post program .The table reveals that their mean knowledge scores for knowledge about disease of leukemia improved between pre and post program (3.40 ± 1.088 to 7.86 ± 1.09 respectively). Besides, their knowledge related to complications on body system pre / post program improved (6.30 ± 2.00 to 14.14 ± 1.95 respectively). As well, nurse's knowledge scores about laboratory tests improved at post test after program (2.24 ± 0.77 to 4.64 ± 0.94 respectively). The score of nurses' knowledge about health instructions for patients with leukemia improved at posttest compared with pretest (5.60 ± 3.07 to 14.22 ± 1.79 , respectively). The total mean score of nurse's knowledge between pre / post program was improved (18.16 ± 7.57 to 40.86 ± 3.7 , respectively). There were highly statistically significant differences between pre/posttest in all items of nurses' knowledge ($p < 0.00$).

Table (2): Shows that the main age of patients with leukemia was 34.50 ± 8.93 , 62.0% of them were males, 32.0% of them were illiterate, 56.0% of them were married, while 46.0% of them had 3- <5 children, 54.0% of them were not working.

Table 2. Distribution of the patients with leukemia according to their socio-demographic characteristics (n=50).

Demographic Characteristics	No	%
Age (in years)		
<20	8	16.0
<30 20	17	34.0
30 <40	10	20.0
40+	15	30.0
Mean ± SD	34.50±8.93	
Gender		
Male	31	62.0
Female	19	38.0
Educational level		
Illiterate	16	32.0
Basic	9	18.0
Preparatory	7	14.0
Secondary school	12	24.0
University	6	12.0
Marital status		
Married	28	56.0
Single	17	34.0
Divorced	5	10.0
Number of Children		
< 2	17	34.0
3 < 5	23	46.0
6 +	10	20.0
Occupation		
Working	23	46.0
Do not work	27	54.0

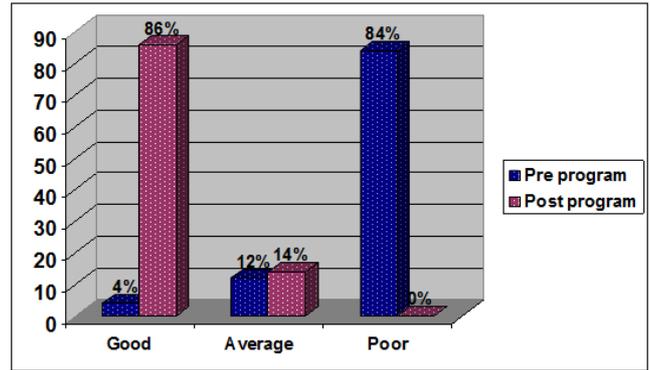


Figure 1. Distribution of nurses according to their total knowledge score pre/ post program implementation.

Figure (I): Illustrates that 84% of the nurses had poor knowledge about leukemia disease, while 4.0% had good knowledge and 12.0% had average before implementing the program, which was improved to reach 86.0% had good knowledge after the program implementation.

Table 3. Distribution of the nurses' knowledge regarding to leukemia disease pre / post program (n=50).

Item	Maximum score	Pre program Mean ±SD	Post program Mean ±SD	Paired t test	p-value
Knowledge about disease of leukemia	10	3.40±1.088	7.86±1.09	17.430	0.00
Complication on body system	18	6.30±2.00	14.14±1.95	19.836	0.00
Laboratory test	6	2.24±0.77	4.64±.094	14.623	0.00
Health instructions for patients with leukemia	18	5.60±3.07	14.22±1.79	19.561	0.00
Total score	52	18.16±7.57	40.86±3.7	23.091	0.00

* not mutually exclusive.

Table 4. Distribution of nurses' performance for patients with leukemia pre/post program implementation (n=50).

Item	Maximum score	Pre program Mean ±SD	Post program Mean ±SD	Paired t test	p-value
Assessment on body system and diagnosis	63	19.38±4.37	51.90±3.64	46.000	0.00
Nursing planning	16	9.64±1.89	14.02±1.59	17.260	0.00
Nursing intervention	10	5.24±2.07	8.78±2.16	11.444	0.00
Nursing procedure: Vital signs	16	8.74±1.88	13.88±1.57	20.239	0.00
Giving oral medication, administration of IV & Blood Transfusion	11	3.46±1.87	8.64±1.57	19.472	0.00
Measuring Weight	14	5.06±1.58	8.44±2.07	14.358	0.00
Nursing evaluation	8	2.98±1.50	4.68±1.43	9.497	0.00
Total score	158	62.22±10.82	125.80±9.43	52.261	0.00

*not mutually exclusive.

Table 5. Variations of standard of nursing care in day care units.

Facilities	available		Not available	
	No	%	No	%
1- Equipment				
Thermometer	44	88.0	6	12.0
Sphygmomanometer	36	72.0	14	28.0
Blood glucose	45	90.0	5	10.0
Syringe pump	31	62.0	19	38.0
Infusion pump	39	78.0	11	22.0
Arrest car	34	68.0	16	32.0

Facilities	available		Not available	
	No	%	No	%
Medication	47	94.0	3	6.0
Mentor	44	88.0	6	12.0
Scale	35	70.0	15	30.0
Oxygen therapy	48	96.0	2	4.0
2- Supplies				
Masks	31	62.0	19	38.0
Size of Syringes	26	52.0	24	48.0
Cannulas	39	78.0	11	22.0
Cotton	33	66.0	17	34.0
Gloves	32	64.0	18	36.0
Gown	34	68.0	16	32.0
Over shoes	24	48.0	26	52.0
Size of catheter	27	54.0	23	46.0
Blood transfusion lines	32	64.0	18	36.0
Alcohol and betadine	28	56.0	22	44.0
Gauze and dressing	35	70.0	15	30.0

Table (4): Presents the distribution of nurses' performance for patients with leukemia at pre/ post program. It indicates that there were statistically significant highly differences between mean scores for nurse's performance for daily care unit for patients with leukemia. There were improvements in assessment on body system and diagnosis (19.38 ± 4.37 to 51.90 ± 3.64 , respectively), nursing planning (9.64 ± 1.89 to 14.02 ± 1.59 , respectively), nursing intervention (5.24± 2.07 to 8.78 ± 2.16 respectively), nursing procedure as: vital signs , giving oral medication , administration of IV therapy , blood transfusion and measuring weight (8.74 ± 1.88 , 3.46 ± 1.87 , 5.06 ± 1.58 verses 13.88 ± 1.57, 8.64 ± 1.57 , 8.44 ± 2.07 respectively) , nursing evaluation (2.98 ± 1.50 to 4.68 ± 1.43 respectively) Concerning total scores of nurses performance for patients, these were highly improved between pre and post program (62.22 ± 10.82 verses 125.80 ± 9.43 respectively). There were highly statistically significant differences between pre/ post test scores in all items of nurses performance (p < 0.00).

Figure (2): This figure illustrated that, 74% of patient were not satisfied for quality of nursing care pre program, improved to 84% satisfied of quality of nursing care post program. There were statically significant difference between

pre/ post test scores in all items for patient satisfaction regarding to quality of nursing care, (p < 0.00).

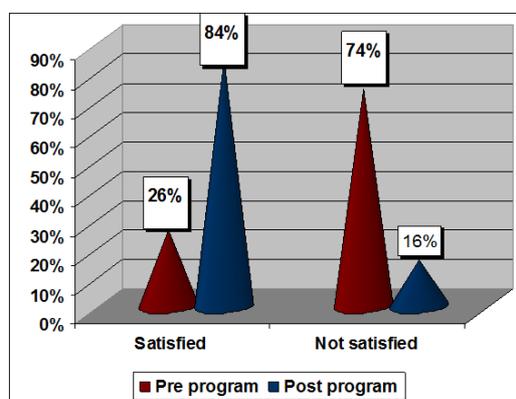


Figure 2. Distribution of patients satisfaction regarding to quality of nursing care pre/post program.

Table (7): Shows that, there was a statistically significant correlation between total knowledge score and total practice score for nurses (pre program r=0,611 to post program r= 0.686) (p < 0.001).

Table 6. Correlation coefficient between total knowledge, total practice scores, age, experience year and educational level pre and post program.

Item	N=50					
	Age		Experience years		Educational level	
	r	P	r	P	r	P
Total knowledge score pre	-.450	<0.01**	-.378	<0.05*	.557	<0.05*
Total knowledge score post	-.576	<0.01**	-.442	<0.01**	.593	<0.05*
Total practice score pre	-.612	<0.01**	-.428	<0.05*	.634	<0.01**
Total practice score post	-.570	<0.01**	-.482	<0.01**	.521	<0.01**

*Correlation is significant at the 0.05 level (2-tailed).
 **Correlation is significant at the 0.01 level (2-tailed).

Table 7. Correlation coefficient between total knowledge score for nurses and total practice score pre and post program

Item	Total knowledge score			
	Pre program		Post program	
	r	p	R	P
Total practice score	Pre program	.611	<0.01**	
	Post program			.686 <0.01**

**Correlation is significant at the 0.01 level.

Table (6): Show that, was a statistical significant correlation between total nurses knowledge score pre & post program in relation to age, experience year and educational level, when pre program ($r = ,450 ,378, 557$, and after program $r = ,576 , 442 - ,593$ and $p, < 0.001 , < 0.005$.) in relation to total nursing practice score pre & post program in relation to age, experience year and educational level, when pre program ($r = ,612 , 428 , 634$ and after program $r = ,570,482,521$ and $p < 0.001$).

6. Discussion

According to the socio-demographic characteristics of the studied group, the current results revealed that more than two fifths of nurses' age ranged between 30 <40 years, with a main age of 32.125=7.546 years. This result is in agreement with that of Jemal et al (2012), who mentioned that less than half of nurses were in the age group of 30<40 years. Regarding to gender, the present study clarified that less than three quarters of nurses were females. This finding is corresponding with that of the study of Hobasy et al. (2010), who found that three quarters of the nurses working in day care units were females.

Considering the types of education, the present study showed that almost one third of them had nursing diploma, while one quarter of them had bachelor in nursing and a minority of them had specialization diploma. These findings are supported by that study conducted by Woolery et al. (2012), who reported that the highest percentage of the oncology nurses had nursing diplomas.

Regarding marital status, more than half of them were married since they were from 30 - < 40 years old. This finding is corresponding with that of Mahamoud (2007), who found in her or his study that more than half of the oncology nurses were married.

As for years of experience in hematology unit, most of them were having experience from 5 - < 10 years, in hematology units. Concerning training course, more than half of them didn't attend any training courses about leukemia. The previous findings were confirmed by Woolery et al (2011), who stated that more than half of the nurses who work in day care units have more than 8 years of experience, and the majority of them didn't receive any training courses about leukemia, which may be attributed to the shortage in nursing staff, so these units can't let them attend any training courses to prevent interruption of work due to their absenteeism.

Table (5): Represents distribution of the facilities in day care unit according to the observation checklist as 38.0% ,32.0 % ,30.0% ,28.0% revealed that concerning for equipment, syringe pump, arrest car, scale and Sphygmomanometer were not available in day care unit. In relation to supplies, size of syringes, over shoes, size of catheter, Alcohol and Betadine were not available in day care unit.

According to the socio-demographic characteristics of the

patients with leukemia, the present study finding indicated that slightly more than one third of patient's age ranged between 30 - < 40 years. This study was similar to another one done by Ramadan (2006), who found that more than one third of patients with leukemia age between 30 < 40 years. Regarding patient's gender, less than two thirds of them were males. This is in accordance with several previous studies as those of Mouneer (2009), and Gurney et al, (2010), who mentioned that leukemia was more common in males than females. This fact is due to the fact that the chromosomes of white blood cells in males are more fragile than females, and gene near to the ABO gene locus on chromosome 9 which relatively protects group O females against leukemia.

Regarding educational level of patients under study, the present study result showed that almost one third of them were illiterates, almost one quarter of them were secondary school education and more than one tenth of them were highly educated (university). This finding was in accordance with Ahmed (2008), who mentioned that more than one third of the patients were illiterates .

Regarding to marital status, the present study finding showed that more than half of patients were married . This finding was in accordance with Mouneer (2009), who found in this study that slightly more than half of them were married; this might be due to the fact that more than half of them were from 30 - < 40 years.

The current study result revealed that less than half of patients with leukemia had 3-< 5 children. In relation to occupation, the result of the current study showed that less than half of them were working, while more than half of them were not working . This finding was in accordance with Wilkes and Redman (2007), who mentioned that more than half of patients with leukemia were not working . This finding could be attributed to the disease as it causes tiredness which maybe the main reason behind their inability to work.

Concerning nurse's total knowledge related to diseases of leukemia, the present study showed poor total knowledge score about disease of leukemic which was improved after implementing the nursing education program. This improvement was statistically significantly different in total nurses' knowledge pre - post program . This finding is in accordance with Lobchuk and Degner (2006), who found in their study that nurses had poor total knowledge of related to disease of leukemia . This could be due to the fact that knowledge of nurses was poor because three quarters haven't got any training courses, and the highest percentage of them were nursing diploma holders.

Concerning nurse's total knowledge related to complications of leukemia on body system (side effects), the present study result showed poor total knowledge score about complications of leukemia on body system, which was improved after the implementation of the nursing education program. This improvement was statistically significant in total nurses' knowledge pre -post. In a similar study, Wickham et al. (2009) revealed that the majority of the nurses had poor knowledge about complications of leukemia

in different body systems as: nausea, vomiting, cardiovascular and musculoskeletal, Immunological, neurological, urinary, and hematological system problems.

Concerning nurse's total knowledge related to normal range of investigation for patients with leukemia in day care units, the present study finding showed poor total knowledge score about laboratory test, which was improved after implementing the nursing education program. This improvement revealed a statistically significant difference in total nurse's knowledge pre- post program. In a similar study carried out by Jacobsen et al. (2007), they found that the nurses had poor knowledge about some of the normal investigation such as: platelets count, prothrombin time, white blood cell count and red blood cell count. In accordance with a current study finding, Jassok (2010) also found that one third of the nurses had poor knowledge about normal range of investigation for bone marrow biopsy, liver and kidney functions.

The current study result revealed that nurses' poor total knowledge score regarding to health instruction about health problems for patients with leukemia was improved after implementing the program. This improvement showed statistically significant difference in total nurses' knowledge pre - post nursing education program. This finding was similar to those of Needleman and Larsen (2007), who clarified that less than two thirds of the nurses had poor knowledge for giving health instructions about the problems for patients with leukemia.

Regarding standards of nursing care for patients with leukemia in day care units, the current study findings revealed that in relation to the first and second steps from standard of nursing process, general assessment and diagnosis, the majority of the nurses don't apply general assessment and diagnosis on body systems which include integumentary, gastrointestinal, respiratory, neurological, genitourinary, cardiovascular, musculoskeletal, and hematological system. All these were improved after program implementation and these improvements revealed a statistically significant difference in total nurses' knowledge pre - post nursing education program . In a similar study, Gitlow (2007), explained that general nursing assessment and diagnosis provide the baseline for quality of nursing care; it's essential steps in critical care units to identify the patient's problems and the effect of leukemia on all body systems and how to be treated . but most of nurses in day care unite don't, apply general assessment and diagnosi.

The present study results indicated that the majority of the nurses didn't apply any standards of quality of nursing care for patients with leukemia in day care units, this might be due to the fact that the nurses were not attending periodical scientific conferences or any training courses to apply standards of nursing process to improve quality of nursing care.

The current study results revealed that nursing planning , which is the third step of nursing process, is an approach used as an organizing framework for the development of standards of nursing care and giving priorities of nursing

diagnosis. The study recorded an improvement in nurse's planning steps performance after program implementation. This improvement showed a statistically significant difference in total nurses' knowledge pre - post nursing education program .The planning provides for continuity of nursing care, and reflects the patients' needs to achieve expected outcomes, also planning is an important approach used in detecting complications and their treatment .

The current study revealed that nursing intervention (implementation). In relation to nurse's intervention to control infection for patient with leukemia in day care unit, the nurses didn't place the patient in a private room. On the other hand, the majority of them didn't instruct patients and their families concerning hand washing. Besides, they didn't intervene for imbalanced fluid, didn't assist patients to sitting position for eating and didn't provide mouth care before and after meals. All these were improved after the nursing education program implementation. This improvement was shown in statistically significant difference in total nurses' knowledge pre - post program.

On the same line, the National Cancer Institute (2009) stated that the implementation approach which is used in the first part deals with intervention about the important side effects of leukemia that most of the nurses working in day care units in hospitals did not implement this step. The patient and the family should participate in implementing the plan to achieve high quality of nursing care for patients with leukemia. Similarly, Crawford and Godowsky (2009), mentioned that the large percentage of practical nurses didn't apply nursing process for chronically ill patients in leukemia, this could be due to the fact that the nurses didn't get enough training about the nature of chronically ill patients.

In the present study, most of the nurses did not follow steps of standards of nursing care (nursing process) which included assessment, nursing diagnosis, planning ,implementation and evaluation .This might be due to the fact that not only nurse's knowledge was poor, but development of training courses about standards of quality of nursing care in day care units was also suffering as well.

Concerning nursing performance (procedure) for patient with leukemia in day care units, the result of the present study showed that the majority of nurses didn't perform blood transfusion procedure accurately, didn't give oral medication and didn't administer inter venous therapy accurately . On the other hand, nurses did not measure weight for patients but they took only vital signs (TPR & blood pressure) procedures accurately. In this respect, Adel (2009) and the National Cancer Institute (2009) stated that the job of nurses is to depend on implementing the practical part which includes doing procedure for patients with leukemia in day care units. This step prescribed levels of nursing practice and standards of professional performance that led to reach high level of quality of nursing care in critical units especially oncology units.

In the current study, evaluation was a very important part in nursing process ,in which the nurse assesses the patient's problems and needs , develops nursing diagnosis , plans for

care and implementation, and evaluates to achieve established goals of care comes at the end. The result of the present study showed that the majority of nurses didn't perform nurses evaluation before implementation the program improved after program. This improvement was shown in statistically significant difference between pre - post program. In this respect, Chucky and Collins (2008) mentioned that evaluation is an ongoing process that enables the nurse to determine what progress the patient has made in meeting goals of care, the evaluation criteria provide also measure for determining the outcome of care.

As for Improvement of the patient's satisfaction regarding to quality of nursing care after program implementation, it revealed a statistically significant difference in total nurses' performance pre /post program. The study results were in accordance with the finding of Mccol et al (2011), who reported that the majority of the patients especially those with cancer were not satisfied with services in day care units regarding quality of nursing care.

Concerning equipment, more than one third of equipment was not available in day care unit as: arrest care, sphygmomanometer, thermometer, blood glucose, infusion pump and scale. Regarding supplies less than half of supplies were not available in day care units as: blood transfusion, lines, gloves, cannulas, gauze, dressing and nearly half for different size of syringes. These results were in agreement with Fowler and Stewart (2011), who recently reported that in day care units in hospitals (oncology units), there is shortage in facilities as equipment and supplies. Also, different percentages were found for facilities in day care units, which explain this difference depending on policy of place, needs of patients, and package of health setting. More than half of equipment was not available in day care units as arrest care; and most supplies were not available as well in day care units as size of syringes.

Regarding to, the correlation between nursing knowledge, and practice, and age, years of experience, the results showed that there was a good relationship between age and years of experience of the nurse and the increase of the acquired practice and knowledge while working for patients with leukemia in day care units. The previous results was highly supported by Shiona and Green (2010), which stated the relation between nursing knowledge, and practice and age, years of experience. The results showed that the greater the age and years of experience of the nurses, the greater their knowledge and practice.

Regarding to, the correlation between nurse knowledge, and performance, and level of education, the results showed that the more qualified nurses, the greater the knowledge and performance at work. The previous results was highly supported by Deborah and Corcoran (2011), which reported that, there is a relation between nurses knowledge, and nursing performance, and level of education which affect quality of nursing care that the patients receive in day care units. So, the standard of quality of nursing care were affected by the nurses level of education.

Regarding to, the correlation between total nursing

knowledge and total nursing performance pre and post program, the results showed that there was a statically significant correlation between total nurses knowledge and total nursing performance score pre & post program. The previous results were highly supported by Swearingen and Ross (2008), which revealed that, the majority of nurses had poor knowledge and performance about patient with leukemia in day care unit, but the nurses knowledge and performance improved after giving training course program about leukemia.

7. Conclusion

The nursing educational program succeeded in improving nurses' knowledge and performance related to care for patients with leukemia as well as their satisfaction with quality of nursing care.

Recommendations

Continuous training education program about standards of nursing process in caring for patients with leukemia in day care units, improving the performance of quality of nursing care, and developing health educational programs in simple Arabic language by using suitable illustrations and media for patients with leukemia in day care units about disease, medication, side effect and management of side effects.

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