

Assessment of Nurses Pitfalls in Caring of Children with Hematological Disorders

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Abstract

Background: Nursing pitfalls are an acknowledged and ever-present problem in healthcare domains . These pitfalls can result in irreparable, irremediable damages (e.g. permanent disability or death). Therefore, their prevention requires constant attention. **Aim of this study:** To assess the nurses pitfalls in caring of children with hematological disorders. **Setting:** This study was conducted in hematological department at three different settings: National Cancer Institute affiliated to Cairo University, El Sheikh Zayed Specialized Hospital affiliated to Secretariat of Specialized Medical Centers and Nasser Institute affiliated to Ministry of Health. **Study subjects:** A convenient sample of all available pediatric nurses (90) were included in this study. **Data collection tools:** Three types of tools were used to collect data, interviewing questionnaire format, observational checklist and nurses' pitfalls attitude scale. **Results of the study revealed that:** More than two thirds of the studied nurses had good total knowledge regarding nursing pitfalls in caring of the children with hematological disorders , total nurse's attitude about reporting their pitfalls in hematological disorders is one hundred percent has positive attitude in bone marrow and inpatient unit and no one of the studied nurses' had poor practice in bone marrow unit while less than one fifth of them had poor practice in inpatient and outpatient unit. **Conclusion:** There was relation between nurses' knowledge, practice, characteristics and their pitfalls during caring of children with hematological disorders from afore mentioned settings, the study achieved the aim. **Recommendations:** Developing nursing guidelines about caring of children with hematological disorders.

Keywords: Nurses, Pitfalls, Hematological, disorders, children.

Introduction

The hematological system comprises of blood, bone marrow and lymphoid tissue. The functions of blood include transportation of oxygen, carbon dioxide, essential nutrients, enzymes and hormones, carrying waste products to the excretory organs, regulation of water electrolyte, acid-base balance & body temperature and Protection against infection (2016).

Disorders of the blood can be acute such as acute leukaemia and lymphoma which are life-threatening and require urgent treatment. and chronic such as hemophilia, sickle cells

disease ,thalassaemia, thrombocytopenia and iron-deficiency anaemia .The nursing care of a child with a blood disorder depend on the type and nature of the disorder (Tortora, 2016).

Hematology-related diseases such as anemia, malaria, sickle cell disease (SCD), and blood cancers have differing rates of survival between high-income and LMICs. Globally, anemia affects 1.62 billion people, which corresponds to 24.8% of the population. The highest prevalence is in preschool-age children (47.4%), and the group with the greatest number of individuals affected is non-pregnant women (468.4 million). SCD is one of the most common diseases worldwide yet in many LMICs, basic facilities for

management are lacking, systematic screening is not common practice, and diagnosis is made late (*Makani & Roberts, 2016*).

Hematology nurses play an important role in sustainably improving pediatric patient outcomes in low- and middle-income countries. However, there is a growing need to manage chronic disease and reduce the burden of hematology-related diseases globally and improve public health. Nurses in LMICs have an unmet need for specialty training and education to address hematology and hemato-oncology disorders. Nurses with adequate levels of specialty hematology nursing education will better meet the health-care needs of pediatric patients (*Buser, 2017*).

Oncology nurse navigators (ONNs) involved in the care of pediatric patients with hematologic disorders face unique challenges that are multifold. Inherently, hematologic disorders are a diverse group that are associated with distinct pathobiologies, etiologies, incidence, and disease courses and thereby are associated with different prognoses and survival. These differences have warranted distinct treatment strategies, which are documented in clinical treatment guidelines developed for each subtype (*National Comprehensive Cancer Network, 2019*).

The management of nursing care for children hospitalized with a chronic condition is characterized as a complex phenomenon which requires the nurse to establish multiple interactions and thinking that values the singularity. The care of their multiple needs demand from nurses and their teams the development of strategies of action and interaction anchored in the perspective of complementarity, reciprocity, recursiveness, and nonlinearity. Only from a dynamic, interdisciplinary and multi-directional approach will the care for the child and his family, in their complexity, be possible. In addition, in the management of nursing care for the child hospitalized with

a chronic condition, the nurse faces multiple situations of uncertainty, unpredictability, with the death / child's life dialogue and particularities of the pediatric context, requesting the development of thinking that appreciates the context and the complexity of the experienced facts (*Silva et al., 2015*).

Nursing pitfalls that occur either do or do not harm pediatric patients and reflect numerous problems in the system,⁴ such as a culture not driven toward safety and the presence of unfavorable working conditions for nurses. To effectively avoid future errors that can cause pediatric patient harm, improvements must be made on the underlying, more-common and less-harmful systems problems most often associated with near misses (*Reason , 2016*).

Significance of the study

Hematological disorders are very common problem that facing pediatric patient and that may be life-threatening condition and required urgent treatment. It represents about 17.39% in the world and about 19.73% in Egypt (*Nwabuko, 2020*) (*Mahmoud et al. ,2020*).

volving in many countries in Africa to encompass the growing and changing demands in clinical and laboratory services as well as blood transfusion so that the researcher point of view That it is grieve that nursing pitfalls in caring of children with hematological disorders may be considered trivial or life threatening therefore the study assess nursing unintended pitfalls to mention methods to surmount its later on. On the other hand, the need for specialty nurses is often overlooked in the face of this public health challenge (*Makani & Roberts, 2016*); so the study emphasize on the importance of nurses specialty to grow up the updating hematological nursing performance.

Aim of the study

To assess the nurses pitfalls in caring of children with hematological disorders through :

- Assessing nurses' level of knowledge, attitude and practice in caring of children with hematological disorders.
- Identifying the nurses' pitfalls when caring of children with hematological disorders.

Research questions

- What are nurses' pitfalls when caring of children with hematological disorders in hematology departments and outpatient clinics?
- To what extent nurses' attitude leading them to commit their pitfalls ?
- Is there is a relation between nurses' knowledge and their pitfalls during caring of children with hematological disorders?
- Is there is relation between nurses' practice and their pitfalls?
- Is there is relation between nurses demographic characteristics and their pitfalls during caring of children with hematological disorders?

Subjects and Methods:

Study design: -

1-Setting:

This study will be conducted in hematology departments, outpatient clinics and Bone Marrow unit in National Cancer Institute affiliated to Cairo university, El Sheikh Zayed Specialized Hospital affiliated to Secretariat of Specialized Medical Centers and Nasser Institute Hospital affiliated to Ministry of Health.

2-Subjects:

A convenient sample included all the available pediatric nurses (90) providing care for children with hematological disorders in the previously mentioned settings.

3-Tools of data collection:

Data will be collected using the following tools:

A – Interviewing Questionnaire format:

It was designed by the researcher after reviewing the related and updated literature, and it used to assess nurse`s

knowledge regarding their pitfalls during care of children with hematological disorders in hematology departments, outpatient clinics and Bone marrow unit. It was written in Arabic language.

It included the following parts:

Part I:

Characteristics data of the nurses involved in care of the children with hematological disorder include (age, gender, years of experience in both general nursing and hematology disorders, qualifications, training courses for caring of children with hematological disorder).

Part II :

Its consisted of nurses knowledge about hematological disorders included (definition, types, causes, signs, symptoms, investigations to confirm diagnosis, complications, methods of prevention, medical treatment, nursing care and new trends in nursing intervention of hematological disorders).

Part III:

Nurse knowledge about common pitfalls during care of children with hematological disorders in hematology departments, outpatient clinics and Bone marrow unit include ;definition of nursing pitfalls, types of nursing pitfalls according to children with hematological disorder, diagnosis, causes of occurrence, methods of discovering and reporting about pitfalls, time of nursing pitfalls reporting, causes to prevent nurses to reporting pitfalls and methods of handling and dealing this pitfalls, methods of prevention, administrative intervention for dealing with nurses pitfalls.

❖ Scoring system:

To assess nurses' level of knowledge about hematological disorders and nursing pitfalls during care of children with hematological disorders. It was designed into (6)open and (47)MCQ questions. Each complete correct answer of question was scored by (2), incomplete answer scored by (1) and incorrect answer was given (zero).

The total scores was (53) marks, then the nurses' scores of answer were summed up and converted into percentage, their level of knowledge was categorized as the following:

Category	Marks	Percentage
Good	40 ≤ 53	75 ≤ 100%
Average	32 < 40	60 < 75%
Poor	< 32	< 60%

B – observational checklist:

Observational checklists were adapted from standardized observation checklist to assess nurses' performance regarding their practice in caring of children with hematological disorders include : blood products transfusion, blood venous sample collection, cannula insertion, oxygen and drugs administration, chemotherapeutic drugs administration, safe handling and management of extravasation, implanted vascular access port care, central line insertion care, assisting in bone marrow aspiration, lumbar puncture and stem cell transplantation, vital signs and physical measures (weight, height or length), each step takes (1) mark for done correctly and not done takes zero (*Australian Government Cancer Australia, 2013*) (*Lynn, 2015*), (*Nicol, 2015*) & (*Vicky, 2016*).

❖ Scoring system:

To assess nurses' Practice. It was designed into (26) procedure. The nurses' scores of each step was summed up and converted into percentage their Practice level was categorized as the following:

C-Nurses Pitfalls Attitude Scale:

This scale adopted from (*Gulec & SerenIntepeler, 2013*) and (*Yung, et al., 2016*). It assessed nurse's attitude toward pitfalls during care of children with hematological disorders in hematology departments and outpatient clinics, according (**Strongly agree, Agree, Disagree, Strongly disagree**).

The scores of items (1,3,5,7,10)

Category	Marks
Strongly agree	0
Agree	1
Disagree	2
Strongly disagree	3

The scores of items (2,4,6,8,9)

Category	Marks
Strongly agree	3
Agree	2
Disagree	1
Strongly disagree	0

Validity and reliability:

Validity:

Content validity carried out to determine whether the tool covers its aim through a group of 3 experts in the field of Pediatric Nursing at the faculty of Nursing, Ain Shams University, and the study tool reviewed regarding the clarity, relevance, comprehensiveness and simplicity.

Reliability:

It was tested statistically to assure that the tool is reliable before data collection. Testing the reliability of the same tool was done by using Cronbach Alpha Coefficient test.

	No. of items	Cronbach's Alpha
Nursing knowledge about hematological disorders	43	0.931
Nursing knowledge about nursing pitfalls	13	0.666
Total Nursing Knowledge	56	0.930
Total Nursing Practice	681	0.931

Pilot study:

A pilot study conducted in 10% of

Category	Percentage
Competent	≥85 %
Incompetent	<85 %

nurses (9) to evaluate the clarity and effectiveness of the study tools and availability of the sample and time will be consumed to fill in tool. The pilot has also served to estimate the time needed for each subject to fill in the questions. According to the results of the pilot, some corrections and omissions of items were performed as needed. The pilot participants were excluded in the main study sample.

Field work:

The actual field work carried out in the period from the beginning of November 2018 till October 2019 using the previously mentioned study tools. The researcher explained the aim and natural of the study for hematology nurses in previously mentioned settings, The researcher was available 2 days /week by rotation (Sunday& Tuesday) from 9 am to 3pm. The researcher started by introducing herself to the studied nurses and gave them a brief idea about the aim of the study.

The interviewing questionnaire format was filled by each nurse. The time consumed to answer the questionnaire ranged from 30 - 35 minutes for each one to complete the study tools. As similar observation checklist was performed during hematology nurses practicing their care for children with hematological disorders , each procedure consumed (5) minutes. From the time consumed, the hematology departments were the fastest unit in data collection than the other settings, while outpatient clinics is the slowest unit in data collection because work pressure on nurses in the three settings . The researcher took (19) nurses from bone marrow units,(39) nurses from inpatient units,(32) nurses from outpatient units in the previously mentioned settings

3-Administrative design

An official permission obtained from dean of faculty of nursing in Ain Shams university and medical and nursing directors of National Cancer Institute, El Sheikh Zayed Specialized Hospital and Nasser Institute hospital. A formal letters obtained to explain the aim of the study in order to their permission and support.

Ethical Considerations:

The researcher explained the aim of the study to nurses to obtain their cooperation. Informed consents were obtained from each nurse who agreed to participate in the study. Anonymity and confidentiality of the study subjects had been assured .They were being informed

that all collected data would be used for researcher purposes only; and they were assured about their rights to withdrawal from the study at any time without giving any reason.

4- Statistical design

Data collected from the studied sample was revised, coded and entered using PC. Computerized data entry and statistical analysis were fulfilled using the statistical package for social sciences (SPSS) version 20. Data were presented using descriptive statistics in the form of frequencies, percentage. Chi-square test was used for comparisons between qualitative variables. Statistical significant was considered at $P \leq 0.01$.

Result

Table (1): Regarding the age group of studied nurses, This table illustrates that less than one half of the studied nurses (46.7%) are in the age group $30 < 40$ years old. Moreover one tenth of studied nurses (10%) are in the age group ≥ 40 years old. Also, one half of studied nurses (50%) held technical nursing institute, and more than two fifths of them (43.3%) have $5 < 10$ years of experiences in hematological disorders. Moreover, less than one half of studied nurses (48.9%) are attended of training courses and less than one fifth of them (17.8%) are attended of training courses regarding hematological disorders.

Figure (1): illustrates that more than three fifth of studied nurses (62.22%) have average total knowledge regarding hematological disorders.

Table (2): This table reveals that, less than one fifth of study nurses (13.33%) have poor knowledge regarding definition of nursing pitfalls, while no one of them have poor knowledge regarding causes of occurrence of nursing pitfalls and causes to prevent nurses for reporting their pitfalls. Moreover, less than one quarter (23.33%) of studied nurses have average knowledge regarding types of nursing pitfalls.

Table (3): shows that all studied nurses (100%) are incompetent in safe

handling of chemotherapy and assessing height of the child who can stand unassisted, while all studied nurses (100%) are competent in assisting in stem cell transplantation.

Figure (2): This figure shows that there is no one of the studied nurses' had poor practice in bone marrow unit while less than one fifth of them (12.8%) (15.6) had poor practice in inpatient and outpatient unit respectively.

Table (4): This table shows that the total nursing attitude about reporting their pitfalls in hematological disorders is one hundred percent (100%) has positive attitude in bone marrow and inpatient unit

Table (1): Distribution of Studied Nurses According to their Characteristics. (n=90).

Nurse's characteristics	No	%
Age in years:		
20 < 30	39	43.3
30 < 40	42	46.7
≥40	9	10.0
	Mean 32.67±SD7.65	
Gender		
Male	31	34.4
Female	59	65.6
Qualification		
Diploma of Nursing	26	28.9
Technical Nursing Institute	45	50.0
Bachelor of Nursing	19	21.1
years of experience in general nursing		
< 1	3	3.3
1 < 5	27	30.1
5<10	39	43.3
≥10	21	23.3
	Mean7.57 ±SD 3.71	
years of experience in hematology disorders		
< 1	17	18.9
1 < 5	39	43.3
5<10	25	27.8
≥10	9	10.0
	Mean5.13 ±SD3.72	
Training courses for caring of children with hematological disorders		
Yes	44	48.9
No	46	51.1
Topics of training courses		
Hematology	16	17.8
Intravenous therapy	12	13.3
Oncology	9	10.0
Bone marrow transplantation	7	7.8

while more than three quarters of them (78.1%) have negative attitude in outpatient unit.

Table (5): illustrates that significant statistically relation between nurses total knowledge and their qualification with X² (17.310^{FE}) at P value (0.001).

Table (6): reveals that there is statistically significant relation between nurses' knowledge and their practice in outpatient unit with X² (10.34) at P value (0.006).

Table (7): clarifies that there is a highly statistical significant relation between knowledge, attitude and their practice among studied subjects (P≤0.01)

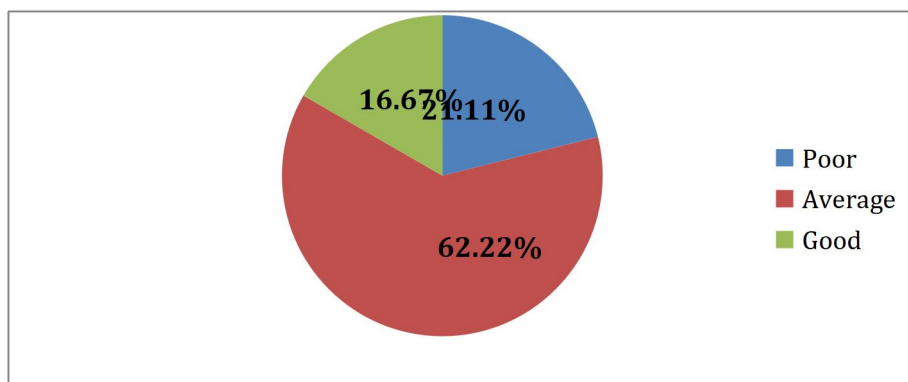


Figure (1): Percentage Distribution of Studied Nurse's Total Knowledge Regarding Hematological Disorders.

Table (2): Distribution of Studied Nurse's Knowledge about Common Nursing Pitfalls in Caring of Children with Hematological Disorders. (n=90).

Nurse's knowledge	Poor		Average		Good	
	No	%	No	%	No	%
Definition of nursing pitfalls	12	13.33	37	41.11	41	45.56
Types of nursing pitfalls	1	1.11	21	23.33	68	75.56
Diagnosis of nursing pitfalls	2	2.22	31	34.44	57	63.34
Causes of occurrence of nursing pitfalls	0	0.00	38	42.22	52	57.78
Methods of discovering nursing pitfalls	2	2.22	28	31.11	60	66.67
Methods of reporting nursing pitfalls	0	0.00	31	34.44	59	65.56
Time of nursing pitfalls reporting	2	2.22	33	36.67	55	61.11
Causes to prevent nurses for reporting their pitfalls	0	0.00	28	31.11	62	68.89
Methods of handling and dealing this pitfalls	1	1.11	35	38.89	54	60.00
Methods of prevention nursing pitfalls	1	1.11	31	34.44	58	64.45
Administrative intervention for dealing with nursing pitfalls	2	2.22	29	32.22	59	65.56

Table (3): Distribution of Total Studied Nurse's Practices Regarding their pitfalls in Hematological Departments.

	N	Incompetent		Competent	
		N	%	N	%
1. Administering a blood transfusion	58	18	31.0	40	69.0
2. Using Venipuncture to Collect a Venous Blood Sample for Routine Testing	90	56	62.2	34	37.8
3. Cannula Insertion	90	50	55.6	40	44.4
4. Administering Oxygen by Nasal Cannula	58	29	50.0	29	50.0
5. Administering Oxygen by Mask	58	38	65.5	20	34.5
6. Using an Oxygen Tent	58	22	37.9	36	62.1
7. Administering Oral Medications	58	42	72.4	16	27.6
8. Administering an Intramuscular Injection	58	39	67.2	19	32.8
9. Administering Medications by Intravenous Bolus or Push Through an Intravenous Infusion	58	43	74.1	15	25.9
10. Instilling Eye Drops	58	39	67.2	19	32.8
11. Administering Medication by inhalation route (Nebulizer)	58	42	72.4	16	27.6
12. Administering chemotherapy	58	25	43.1	33	56.9
13. Safe handling of chemotherapy	58	58	100.0	0	0.0
14. Managing chemotherapy extravasations	58	24	41.4	34	58.6
15. Implanted vascular access port care	58	22	37.9	36	62.1
16. Central line care	58	31	53.4	27	46.6
17. Assisting in bone Marrow aspiration	39	27	69.2	12	30.8
18. Assisting in lumbar puncture	39	17	43.6	22	56.4
19. Assisting in stem cell transplantation	19	0	0.0	19	100.0
20. Assessing Body Temperature	90	49	54.4	41	45.6
21. Assessing a Peripheral Pulse by Palpation	90	63	70.0	27	30.0
22. Assessing Respiration	90	70	77.8	20	22.2
23. Assessing Blood Pressure by auscultation	90	58	64.4	32	35.6
24. Assessing weight of older child	90	70	77.8	20	22.2
25. Assessing length of the child 24-36 months of age or older child who can't stand unassisted	90	64	71.1	26	28.9
26. Assessing height of the child who can stand unassisted	90	90	100.0	0	0.0

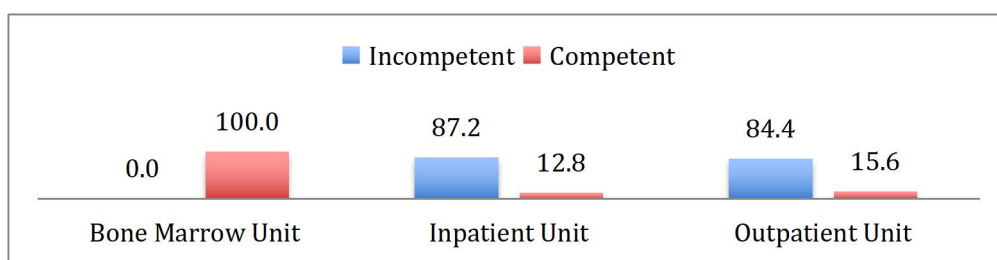


Figure (2): Total Practice of Studied Nurse's according to Units Protocols.

Table (4): Distribution of Total Attitude among Studied Nurses. (n=90).

Unit	Negative		Positive	
	N	%	N	%
Bone Marrow Unit (n1=19)	0	0.0	19	100.0
Inpatient Unit (n2=39)	0	0.0	39	100.0
Outpatient Unit (n3=32)	25	78.1	7	21.9
Total (N=90)	25	27.8	65	72.2

Table (5): Relation between Characteristics of Studied Nurses and their Total Knowledge.

	Knowledge						X ²
	Poor		Average		Good		
	N	%	N	%	N	%	
Age in years:							
20 < 30	31	45.6	6	40.0	2	28.6	2.072 ^{FE}
30 < 40	29	42.6	8	53.3	5	71.4	0.746
≥40	8	11.8	1	6.7	0	0.0	
Gender							
Male	25	36.8	3	20.0	3	42.9	1.789 ^{FE}
Female	43	63.2	12	80.0	4	57.1	0.475
Qualification							
Diploma of Nursing	22	32.4	4	26.7	0	0.0	17.310^{FE}
Technical Nursing Institute	38	55.9	6	40.0	1	14.3	0.001**
Bachelor of Nursing	8	11.8	5	33.3	6	85.7	
Years of experience in general nursing							
< 1	3	4.4	0	0.0	0	0.0	3.235 ^{FE}
1 < 5	22	32.4	4	26.7	1	14.3	0.774
5<10	28	41.2	6	40.0	5	71.4	
≥10	15	22.1	5	33.3	1	14.3	
years of experience in hematology disorders							
< 1	15	22.1	1	6.7	1	14.3	5.150 ^{FE}
1 < 5	31	45.6	5	33.3	3	42.9	0.503
5<10	16	23.5	7	46.7	2	28.6	
≥10	6	8.8	2	13.3	1	14.3	
Training courses for caring of children with hematological disorders							
Yes	31	45.6	10	66.7	3	42.9	2.297 ^{FE}
No	37	54.4	5	33.3	4	57.1	0.306

Table (6): Relation between Mean Scores of Nurses Knowledge and Their Practices in Relation to Working Units.

Practices	Knowledge				X ²		
	Poor		Average		Good		P value
	N	%	N	%	N	%	
Bone Marrow Unit							
Incompetent	0	0.0	0	0.0	0	0.0	-
Competent	16	100.0	2	100.0	1	100.0	-
Total	16		2		1		
Inpatient Unit							
Incompetent	25	92.6	7	77.8	2	66.7	3.220 ^{FE}
Competent	2	7.4	2	22.2	1	33.3	0.174
Total	27		9		3		
Outpatient Unit							
Incompetent	24	96.0	2	50.0	1	33.3	10.34^{FE}
Competent	1	4.0	2	50.0	2	66.7	0.006**
Total	25		4		3		
Total practice							
Incompetent	49	72.1	9	60.0	3	42.9	3.058 ^{FE}
Competent	19	27.9	6	40.0	4	57.1	0.234
Total	68		15		7		

Table (7): Relation between Nurses Scores of Knowledge, Attitudes and Practice among Studied Nurses.

	Positive		Practice Negative		X2 P value
	N	%	N	%	
Knowledge					
Poor	22	32.4	46	67.6	2.511 FE
Good	2	13.3	13	86.7	0.324
Average	1	14.3	6	85.7	
Practice					
Incompetent	25	41.0	0	0.0	23.782
Competent	36	59.0	29	100.0	0.000**

Discussion

Nurses play an important role in sustainably improving pediatric patient outcomes in low- and middle-income countries (LMICs). there is a growing need to manage chronic disease and reduce the burden of hematology-related diseases globally and improve public health. Nurses with adequate levels of specialty hematology nursing education will better meet the health-care needs of pediatric patients (*Buser.2017*). So this study aimed to assess nurses pitfalls in caring of children with hematological disorders

Concerning the characteristics of the studied nurses, the results illustrated that less than one half of the studied nurses, their age ranged between 30 < 40 and more than of them were females. This result agree with a study done by *Alfartosy, (2017)* entitled “Assessment Nurses’ Practices about Hemophilia for Children attending Heredity Blood Disease Center in Al-Nasiriya City” who mentioned that, more than one third of the studied nurses, their age ranged between 30 <39 and about two third of them were females.

Also the findings revealed that half of the studied nurses held technical nursing institute and more than two fifths of them had 5<10 years of experiences in hematological disorders. This result disagree with a study done by *Elewa & Ahmed ,(2017)* entitled “Effect of an Educational Program on Improving Quality of Nursing Care of pediatric Patients with Thalassemia Major as Regards Blood Transfusion” who mentioned that, less

than three-quarters of studied nurses graduated from technical institutes and more than one half of them had less than five years of experience.

Regarding attending of training courses, the present study illustrated that less than one half of studied nurses were attended of training courses and less than one quarter of them were attended of training courses regarding hematological disorders. This result disagree with a study done by *Abolwafa et al.(2019)* entitled “Quality of Nursing Care among School Age Children with Thalassemia as Regards Blood Transfusion and Self Concept” who mentioned that, more than two thirds of the studied nurses did not receive any training courses and all of them didn’t receive any training courses related to hematological disorders. From the researcher point of view this result might be due to the shortage of clinical nursing staff preventing them from attending any training courses to avoid work interruption or unavailability of training courses regarding hematological disorders.

Concerning the nurse’s total Knowledge regarding hematological disorders the results revealed that, more than three fifth of the studied nurses had average total knowledge regarding hematological disorders. This result In contrast a study done by *Alfartosy, (2017)* who mentioned that, more than half of the studied nurses had insufficient total knowledge. From the researcher point of view these results might be due the absence of in-service-training programs and the

handout and leaflets which help nurses get the required knowledge whenever they need. Also, it might be due a lack of preparation during basic education.

The present study revealed that more than two thirds of the studied nurses had a good total knowledge regarding common nursing pitfalls in caring of children with hematological disorders. This result was in agreement with a study done by *Sanghera et al.(2015)* entitled “The attitudes and beliefs of healthcare professionals on the causes and reporting of medication errors in a UK intensive care unit” who mentioned that more than two third of studied nurses had good knowledge about common medication errors inside intensive care unit.

Concerning to total nurses' practice in pediatric patients with hematological disorders the results illustrated that all studied nurses were incompetent regarding the total nurses' practice in pediatric patients with hematological disorders about safe handling of chemotherapy and Assessing height of the child who can stand unassisted. This result was in agreement with *Pasaol.(2019)* entitled “Assessment of Knowledge, Attitude, Practice and Barriers toward Palliative Care among Pediatric Oncology Health Care Providers in Southern Philippines” who mentioned that majority of the pediatric oncology health care providers’ level of practices were inappropriate towards palliative care Among the pediatric oncology patients such as (safe handling of chemotherapy and Assessing height of the pediatric oncology patients).

Also, results showed that all studied nurses were competent regarding the total nurses' practice in pediatric patients with hematological disorders about stem cell transplantation. This result incongruent with a study done by *Washeel, Ma'ala G.(2017)* entitled “Assessment Nurses' Practices about Hemophilia for Children attending Heredity Blood Disease Center in Al-Nasiriya City” who illustrated that

nurses had low level of the total nurses' practice in pediatric patients with hematological disorders. From the researcher point of view, It could be related to low awareness in health care management systems and little integration of palliative care services with regular health care services.

Concerning to total nurses' practice in pediatric patient with hematological disorders according to Units, the results illustrated less than one quarter of the studied nurses had incompetent practice in inpatient and outpatient unit. This result disagree with *Alfartosy, (2017)* who mentioned that one third of the studied nurses had competent practice in inpatient and outpatient unit. From the researcher point of view, It could be related to increase workload in inpatient and outpatient unit.

Concerning total nursing attitude about reporting their pitfalls in hematological disorders the results revealed that, all the studied nurses had positive attitude in bone marrow and inpatient unit, while more than three quarters of them had negative attitude in outpatient unit. This result was in disagreement a study done by *Sanghera et al.(2015)* who mentioned that more than two third of the studied nurses had negative attitude about reporting their medication errors inside intensive care unit dispute the nurses inside bone marrow, inpatient and outpatient units.

Concerning relation between characteristics of studied nurses and their total knowledge the results revealed that, there was statistical significant difference between the studied nurses qualification and their total knowledge. This result was in agreement with *Abu Sharour.(2019)* entitled “A cross-sectional study on oncology nurses’ knowledge and practice of oral mucositis among cancer patients in Jordan International” who mentioned that, a statistically significant difference between educational level of the studied nurses and their level of total knowledge.

Also, the results in the same line with *Washeel & Ma'alaG,(2017)* who mentioned that, there was a statistical significant association between nurses' educational level and their knowledge concerning hemophilic child. Moreover, the results in agreement with *Abed El-Hay et al.(2018)* who mentioned that there were a positive correlation among nurses' knowledge and their socio-demographic characteristic included; age, gender, level of education, and years of experience for care of pediatric patient with transplantation, job description and previous attendance of training courses about Bone Marrow Transplantation.

Concerning relation between mean scores of nurses Knowledge and their practices in Relation to Working Units the results revealed that, there was statistically significant relation between nurses' knowledge and their practice in outpatient unit. This result congruent with *Alfartosy,(2017)* who mentioned that, there was statistically significant relation between nurses' knowledge and their practice in outpatient unit.

Concerning relation between attitudes, knowledge and practice among Studied nurses the results revealed that, there were a highly significant correlation between knowledge, attitude, practice, and their characteristic among the studied nurses. This result congruent with *Pasaol,(2019)*. who mentioned that there were positive correlations between Knowledge, skills and attitude among pediatric oncology nurses.

Conclusion

The current study findings concluded that more than three fifth of studied nurses had average level of total knowledge regarding hematological disorders, while more than two thirds of them had good total knowledge regarding common nursing pitfalls in caring of children with hematological disorders. On the other hand, more than one half of the studied nurses had incompetence level of

practices regarding caring of children with hematological disorders, while less than three quarters of them had reporting their pitfalls in hematological disorders. In addition, There was relation between nurses' knowledge, practice, characteristics and their pitfalls during caring of children with hematological disorders. The common nurses' pitfalls were misidentification of the pediatric patient, medication error, improper use of equipment , inadequate failure to provide sufficient monitoring and infection control to pediatric patient and missed nursing care to pediatric patient , from afore mentioned settings, the study achieved the aim .

Recommendations

In the light of the findings of the current study the following recommendations are suggested:

- Collaborating, developing nursing guidelines about caring of children with hematological disorders.
- Providing hematology nurses with brochures, booklets, intervention media program containing simple information about caring of children with hematological disorders.
- Counseling services prevention, detection and management of nurses pitfalls should be available in each study settings.
- Continuous education and training for hematology nurse to update their knowledge, attitude and practice in order to give quality nursing care for pediatric patient with hematological disorders.
- Standardized nursing procedures should be used to guide the nurse in dealing with critically ill pediatric patient with hematological disorders.
- Prescription of medication must be written and legible.
- Instruct and encourage nurses at hematological departments, outpatient clinics & bone marrow units about the importance of early reporting of pitfalls without fearing of punishment.

- The hematological departments, outpatient clinics & bone marrow units should be adequately staffed and well equipped through the three shifts.
- Emphasize on monitoring and supervision of pediatric patient with hematological disorders and care provider at each study settings.

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