A study to evaluate the nurse's knowledge on prevention of sample lysis among oncology patients in the critical care unit at Apollo Cancer Centre, Chennai

Ms. Deepa P[1], Ms. Muthuram. G[2], Ms. Basemath. S.S.Morris[3,] Ms. Rohini Sharma[4]

[1](Nursing Officer, Apollo Cancer Centre, Chennai, India)
[2](Chief Nursing Officer, Apollo Cancer Centre, Chennai, India)
[3](Nurse Educator, Apollo Cancer Centre, Chennai, India)
[4](Vice Principal, ASON, New Delhi, India)

Abstract:
Background: *Collecting blood samples is a frequently used method to diagnose and monitor diseases. Blood results reveal the patient's overall health condition, more specific diseases, and conditions. Safe sampling techniques are important for timely diagnosis and treatment. Pre-analytical quality in clinical chemistry testing is as important as analytical and post-analytical quality. The most prevalent pre-analytical interference and a major source of error producing unreliable laboratory test results from hemolysis of blood samples causing unnecessary rejections.*
Materials and Methods: *A Pre - Experimental study was conducted at Apollo Cancer Centre, Chennai with 48 registered nurses to assess the knowledge on safe sampling techniques among oncology patients in the critical care unit. The quantitative research approach is used for this study as well as a structured questionnaire was used as a tool to assess the knowledge regarding the prevention of lysed samples through Google form. A pre-test was conducted which was followed by a structured teaching program and a post-test. Data collection from all the registered nurses working in the Critical Care Unit and who met the inclusion criteria.*
Results: *In the Pre Test, the staff's level of knowledge was as follows: Very good- 13%, Good-81%, Average - 6% in the post-test the knowledge of the staff improved 83% had very good knowledge and 17% had good knowledge. The effectiveness of the structured teaching program was evaluated using a t-test and it was found to be significant at $p < 0.05$, hence the research hypothesis that "There will be a significant difference in the level of knowledge of the nurses on safe sampling technique after the structured teaching program" was accepted.*
Conclusion: *The structures teaching program helped to enhance nurses' knowledge of safe sampling techniques. Hence periodic training and close supervision of the nurses will help in the prevention of sample hemolysis and ensures patient safety and satisfaction*
Key Word: *Hemolysis, structured teaching program, safe sampling techniques, knowledge*

I. Introduction

Blood sample collection is necessary and important for diagnosing and treating patients. Blood samples are collected by the phlebotomist at a scheduled time but in CCU the samples are collected by the nurses to avoid delay in obtaining results. The blood sampling collection procedure is often affected by pre-analytical errors, leading to consequences such as delayed diagnosis, treatment, and hospital stay, as well as repeated sampling. Pre-analytical quality in clinical chemistry testing is as important as analytical and post-analytical quality. The most prevalent pre-analytical is hemolysis of blood samples resulting in sample rejections.

A study was conducted by **Hatice Yüksel** to assess the awareness of the nurses on blood and urine sample collection procedure study revealed that nurses need to improve their knowledge on tourniquet application time, the container used to collect various samples and inverting tubes with additives gently at least 5–6 times after blood sampling[1]. Thorough knowledge and skills are to be ensured among the nurses who carry out this procedure regularly to ensure the safe handling of samples and to minimize pre-analytical errors of laboratory blood investigation.
.

II. Material And Methods

Quantitative Pre – Experimental research approach was used to evaluate the nurse's knowledge on the prevention of sample lysis among oncology patients in the critical care unit at Apollo Cancer Centre, Chennai. The research design adopted was one group, Pre-test post-test design. The data collection period lasted for three months from Oct to Dec 2021. The samples size was 45 and was selected based on the inclusion criteria. A convenience sampling technique was used. Data was collected using Google form (Pre-test was conducted with questioner followed by structured teaching program and evaluation of knowledge by post-test questioner form)

Inclusion criteria:
* Front line nurses who are providing direct nursing care in the critical care unit
* RN who is willing to participate
* RN who is present on duty on the day of study

Exclusion criteria:
* RN working inwards
* RN on other roles (ICN, CN, NO)
* RN with experience of 5 years and above.

Procedure methodology
A questionnaire was developed by the researcher to assess the knowledge of staff about the safe sampling technique and it was shared with the sample through the Google form
It comprises two sections

Section A consisted of nurse's consent for the willingness to participate in the study, following which demographic variables such as qualification and work experience was collected

Section B consisted of 10 multiple choice questions related to the safe sampling technique. The correct answer was scored 1 mark and the wrong answer zero. The level of knowledge of the nurses was categorized based on the score obtained

Level of knowledge	Score	Percentage
Very Good	8-10	80% -100%
Good	5-7	50% -70%
Average	0-4	0-40%

Ethical clearance was obtained to conduct the study. The link of the Pre-test was shared with the samples during the 1st two weeks of October 2021. All samples were trained on safe sampling techniques for 4 weeks. Post-test was conducted in Dec 2021(Online).

Statistical analysis
The data was analyzed using Descriptive [Frequency and percentage], Chi-square was used to find the association between the demographic variables and level of knowledge, the effectiveness of the structured teaching program was assessed using inferential statistics [t test]. The level $P < 0.05$ was considered as the cutoff value or significance.
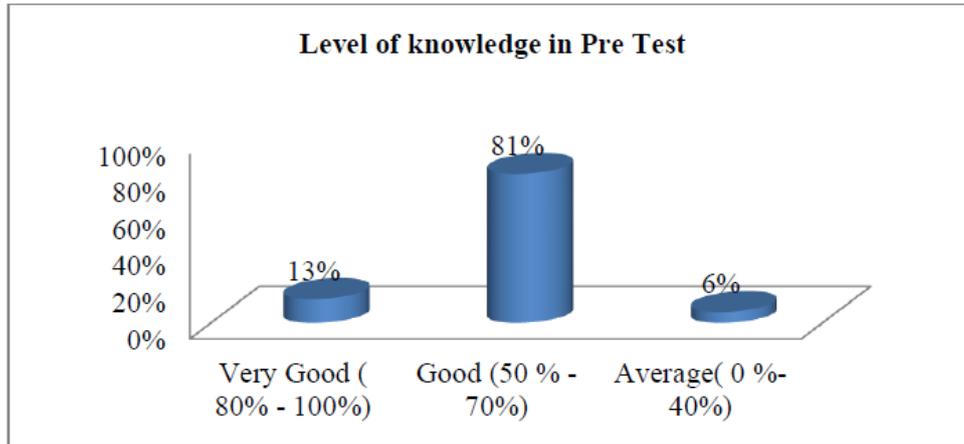
III. Result

Table-1: Demographic variables

S No	Demographic variables	Frequency	Percentage
	Qualification		
1	GNM	7	15%
	BSc Nursing	39	81%
	PB BSc Nursing	2	4%
	Experience		
2	0 -1 year	18	38%
	1-2 Years	17	35%
	2-5 Years	13	27%

The data given in table 1 describes that among the 48 samples who participated in the study, 7(15%) were GNM qualified, 39 (81%) BSc Nursing, and 2 (4%).PB BSc Nursing. Of the experience, 18 (38%) had less than 1 year. 17(35%) had 1–2 years and 13 (27%) had 2 -5year of experience.

Table-2: Pre Test Level of knowledge of nurses on safe handling technique

Level of knowledge	Frequency	Percentage
Very Good (80% - 100%)	6	13%
Good (50 % - 70%)	39	81%
Average (0 %- 40%)	3	6%

Figure-1: Percentage of Pre Test Level of knowledge of nurses on safe handling technique
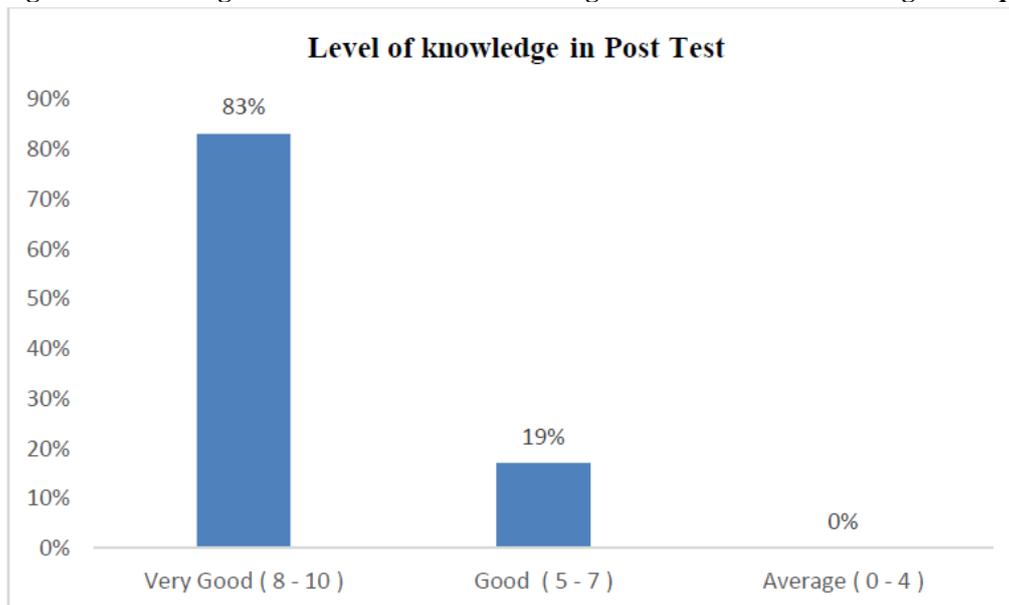

The Pre Test revealed that 81% of the sample had Good knowledge, 13% had very good knowledge, and 6% had average knowledge on safe sampling techniques.

Table-3: Post Test Level of knowledge of nurses on safe handling technique

Level of knowledge	Frequency	Percentage
Very Good (80% - 100%)	40	83%
Good (50 % - 70%)	8	17%
Average (0 %- 40%)	0	0%

Figure-2: Percentage of Post Test Level of knowledge of nurses on safe handling technique

The Post Test revealed that 83% of the sample had Very Good knowledge, 19% had Good knowledge 0% had average knowledge on safe sampling techniques.

Table 3: Association with demographic variable and level of knowledge

Demographic variable	Level of knowledge			χ^2	df	p-value (<0.05)	Remark
	Very Good	Good	Average				
Qualification							
GNM	1	6	0				
BSc Nursing	5	31	3				
PB BSc Nursing	0	2	0	1.081	4	9.49	Non-Significant
2. Experience							
0 -1 year	3	14	1				
1-2 Years	2	13	2				
2-5 Years	1	12	0	2.43	4	9.49	Non-Significant

There was no significant association between the demographic variable and level of knowledge on sampling technique at $p <0.05$ level of significance.

Table 3: Comparison of Pre and Post-test level of knowledge

	Mean	Standard deviation	t-Test	p-Value,< 0.05	Remark
Pre Test	-105	1.58	9.91	1.697	Significant
Post Test					

On comparing the Pre and post-test level of knowledge of nurses on safe handling of sampling techniques. It was evidenced that the structured teaching program effectively improved the nurses' knowledge. The calculated t-Test value was 9.91 which is greater than the p-value 1.697 at 0.05 level of significance.

IV. Discussion

The study to evaluate the nurse's knowledge on the prevention of sample lysis among oncology patients in the critical care unit was done with the following objectives.

To assess the level of knowledge of nurses on safe sampling techniques before STP (Structured teaching program). The Pre Test findings revealed that 81% of the sample had Good knowledge, 13% had very good knowledge, and 6% had average knowledge on safe sampling techniques. A similar study was done by **Nkhoma NM**[2]: Staff confidence and knowledge on the causes of Blood sample hemolysis concluded that inconsistency in the staff knowledge is one of the causes for blood sample hemolysis[2].

To assess the level of knowledge of nurses on safe sampling techniques after STP (Structured teaching program). The Post Test revealed that 83% of the sample had Very Good knowledge and 17% had Good knowledge of safe sampling techniques.

To associate the demographic variables with the level of knowledge. There was no association between the demographic variable and the level of knowledge of the nurses on the safe sampling technique.

To evaluate the effectiveness of the structured teaching program. On comparing the Pre and post-test level of knowledge of nurses on safe handling of sampling techniques. It was evidenced that the structured teaching program effectively improved the nurses' knowledge. The calculated t-Test value was 9.91 which is greater than the p-value 1.697 at a $p <0.05$ level of significance. Hence the research hypothesis is "There will be a significant difference in the level of knowledge of the nurses on safe sampling technique after the structured teaching program" was accepted. The finding is supported by a similar study done by **Rupinder Kaur** to assess the Knowledge of Student Nurses on Venous Blood Specimen Collection which concluded that the knowledge of the students was improved after the self-structured teaching program on venous blood specimen collection[3].

V. Conclusion

The study results confirmed that inconsistency in the staff knowledge is one of the causes of blood sample hemolysis. Inclusion of training, regular sharing of updates amongst all staff can minimize blood sample hemolysis and facilitate proficiency of the staff. Furthermore, monitoring and evaluation of the training, the conduct, and the rate of hemolysis are required in facilitating the implementation of high-quality services based on current evidence.

References

[1]. Yüksel H, Kaplan İ, Toprak G, Evliyaoğlu O, Kuş S, Azizoğlu M, Mete N. A questionnaire study among nurses: awareness of blood and urine sample collection procedures. Clinical Chemistry and Laboratory Medicine (CCLM). 2014;52(8): e159-e161. https://doi.org/10.1515/cclm-2013-1118
[2]. Makhumula-Nkhoma, Nellie & Wittaker, Vicki. Blood sample hemolysis: Staff confidence and knowledge on the causes. (2014). https://my.rcn.org.uk/__data/assets/pdf_file/0011/568397/2014_poster_We01.pdf
[3]. Rupinder Kaur. A Pre-Experimental Study to Assess the Knowledge Regarding Venous Blood Specimen Collection among Student Nurses. International Journal of Nursing Care.2019: 7(1):64-68.