

Nurses' Knowledge and Practices regarding Venous Blood Sampling Withdrawal in Neonates

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Abstract

Background: Venous blood sampling withdrawal considered the most common procedures that performed in neonatal intensive care unit. So, the nurse play an important role in eliminating of problems which may occur and collaborating with other health professionals in handling the plan of care. **Aim:** This study aimed to assess nurses' knowledge and practices regarding venous blood sampling withdrawal for neonates at neonatal intensive care unit. **Research design:** A descriptive design was utilized to conduct this study. **Setting:** This study was conducted at neonatal intensive care units in Benha University Hospital. **Subjects:** A convenient sample of (70) nurses and a convenience sample of (70) neonates who are undergoing venous blood sampling withdrawal. **Tools of data collection:** Two tools were used **Tool (I):** A structured interviewing questionnaire sheet to assess nurses' knowledge regarding venous blood sampling withdrawal for neonates. **Tool (II):** An observational checklist to assess nurses' practices regarding venous blood sampling withdrawal for neonates. **Results:** Less than half of the studied nurses had good knowledge and majority of them had competent level of practice regarding venous blood sampling withdrawal. **Conclusion:** There was a positive correlation between nurses' total knowledge and their total practices regarding venous blood sampling withdrawal in neonates. **Recommendation:** Developing periodic training programs for nurses regarding care of neonates undergoing venous blood sampling are recommended to update their knowledge.

Keyword: Nurses' knowledge and practice, Venous blood sampling withdrawal, Neonates.

Introduction:

Venous Blood Sampling Withdrawal (VBSW) has been practised for centuries and is still one of the most common invasive procedures in health care. Also, VBSW is available primarily for enhancing diagnosis and monitoring neonates' status. It calls for rigorous adherence to test procedures and guidelines to ensure neonates' safety and integrity of blood samples (Lippi et al. , 2019).

Adverse effects of VBSW can be occurred as; false blood culture results, prolong hospitalization, delay diagnosis and cause unnecessary use of antibiotics. Jostling and

jarring of test tubes in transit can lyse or break open red blood cells, causing false laboratory results. Other adverse effects for neonates are common , include bruising at the site of puncture , nerve damage , haematomas and pain (Renton et al. , 2019).

Nursing staff play a key role within the diagnostic testing process also; they often identify the need for diagnostic and microbiological investigations, initiate the collection of specimens and assume responsibility for timely and safe transportation to the laboratory. Nurses responsible for collecting , transporting and

storing specimen that can have major impact on laboratory results. Also, the nursing staff should follow aseptic technique when performing a venepuncture as the skin is breached and a foreign device is introduced into a sterile circulatory system. The two major sources of microbial contamination are cross-infection from nurses to neonates and skin flora of the neonate (Speedie & Meddilton, 2021).

Neonatal nurse should be trained in venous blood sampling withdrawal to prevent unnecessary risk of exposure to blood and to reduce adverse events for neonates. Groups of health workers who historically are not formally trained in venipuncture should be encouraged to take up such training; lax infection prevention and control practices result in poor safety for staff and risk to neonates (Hjelmgren et al., 2021).

Significance of the study :

Infection is the most common complications that can occur in neonates related to venepuncture. The incidence of infection related to venipuncture is 49.9% among admitted neonates in Egypt (El-Sokary, 2019). Lack of knowledge about accurate venous blood sampling withdrawal can lead to unfavorable consequences. The role of the nurse is important in conducting the blood sampling process and prevent errors in results (Lippi, & Salvango, 2019). So, this study was conducted to assess the nurses' knowledge and practices regarding venous blood sampling withdrawal for neonates at neonatal intensive care units.

Aim of the study:

The aim of the study was to assess nurses' knowledge and practices regarding venous blood sampling withdrawal in neonates.

Research questions:

What is the level of nurses' knowledge regarding venous blood sampling withdrawal for neonates?

What is the level of the nurses' practices regarding venous blood sampling withdrawal for neonates?

Is there a relation between the nurses' knowledge, practice and their personal characteristics?

Subjects and method:

Research design:

A descriptive design was used to conduct this study.

Setting:

The current study was conducted at neonatal intensive care units in Benha University hospital which is located in the fourth floor of the medical building and consists of 3 rooms; the first room includes (12 incubators), the second room includes (7 incubators) and the third room includes (5 incubators).

Subjects:

A convenience sample of (70) nurses worked at the previously mentioned setting included in the study regardless of their personal characteristics during the period of the study. A convenience sample of (70) neonates who are undergoing venous blood sampling withdrawal.

Tools of data collection and technique :

Data collection was gathered by using the following two tools:-

Tool (I): A structured interviewing questionnaire sheet: It was developed by the researcher after reviewing scientific and relevant literatures and translated into Arabic language to suit all levels of nurses including three parts:

Part 1: Nurses' characteristics: It consists of; age, gender, level of education, years of experience and previous training program regarding venous blood sampling withdrawal.

Part 2: Neonates' Characteristics : such as current age, gender, type of delivery,

gestational age , birth weight , length of the neonate and medical diagnosis.

Part 3: Nurses' knowledge regarding venous blood sampling in neonates based on **Stout &Foley, (2017); Hinkle &Cheever, (2018) ; Shellady &Peters, (2020)**. It consists of (39) multiple choice questions and divided under three categories:

-Nurses' knowledge regarding venous blood sampling withdrawal from peripheral veins (25questions). Nurses' knowledge regarding venous blood sampling withdrawal from central venous catheter (7questions).

-Nurses' knowledge regarding venous blood sampling withdrawal from umbilical venous catheter (7 questions).

-Total degree of questions are 0 - 78 degrees.

Scoring system for nurses' knowledge:

The scoring system from 0 to 2 score according to correct and complete answers given score (2), correct and incomplete answers given score (1) and incorrect answer or don't know given score (0).

The total level of knowledge was categorized as following:

- *75% considered a good level of knowledge.
- *50% < 75% was considered average level of knowledge.
- *Less than 50% was considered poor level of knowledge

Tool (II): An observational checklist: This tool adopted from **Bowden&, & Greenberge, (2018) and Lynn,(2019)** , it was used to observe nurses' practice regarding venous blood sampling withdrawal in neonates. It consisted of 64 steps categorized under three parts:

Part (1) venous blood sampling withdrawal from peripheral veins (22 steps).

Part (2) venous blood sampling withdrawal

from central venous catheter (25 steps).

Part (3) venous blood sampling withdrawal from umbilical venous catheter (17 steps).

-Total degree of steps are 0-64 degrees .

Scoring system for nurses' practices:

*Score (1) was given for each step done

*Score (0) was given for each step not done .

The total scoring for nurses' practices:

*Score < 85% was considered unsatisfactory practices .

*Score \geq 85% was considered satisfactory practices.

Content validity and reliability :

The revision of the tools was done by a jury of three experts in the field of Pediatric Nursing , Faculty of Nursing , Benha University to measure the content validity of tools and the necessary modifications was done accordingly such as arranging questions according to priority and procedures categorized (before, during and after) also mention the neonatal length as in protocol. Reliability of tool was tested to ensure that an assessment tool produces stable and consistent result over times. Reliability was assessed by using Cranach's alpha coefficient and it was 0.951 for knowledge and 0.737 for practice.

Ethical consideration:

A research approval was obtained for ethical committee of Faculty of Nursing , Benha University before starting the study, written letter clarifying the purpose of the study. Oral consent was taken from every nurse before data collection in order to be engaged in the current study and assured them that they have the right to withdraw from the study at any time . Complete description of the purpose and nature of the study was approached and confidentially was assured to the studied nurses.

Pilot study:

The pilot study was carried out on 10% (7 nurses) of the total study subjects to assess the feasibility of the study tools, as

well as to estimate the time needed for the data collection . Because of no modifications were carried out on the study tools as revealed from results of pilot study , therefore ; the subjects included in the pilot study were included in the study sample .

Field work:

The actual field work of this study was carried out over six months period started from the beginning of June 2021 till the end of August 2021. Through this period , the researcher attended the setting two days per week (Sunday and Wednesday) in the morning shift from 9 A.M. to 2 P.M. to collect data alternatively in the study setting . The average number of interviewed nurses were 5-6 nurses per day. The researcher started by introducing herself to the nurses and gave them a brief idea about the aim and nature of the study prior data collection. Each nurse was interviewed individually to gather the necessary data of the study. The nurses were asked to give their responses according to the study tools .The data of neonates undergoing venous blood sampling were collected by the researcher from the medical record and it took 10-15minutes. The researcher gave the studied nurses questionnaire (tool I) for filling to assess their knowledge and it took 20-25 minutes. Also, the researcher assess their actual practices by using observational checklist (tool II). The average time needed for the completion of each observation was between 30-35 minutes.

Statistical analysis :

Data collected from the studied sample was organized, analyzed and tabulated then revised, coded and entered using 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, percentages. Chi-square test (X^2) was used

for comparisons between qualitative variable's and correlation coefficient (Spearman's rank test) was used to test correlation between variable's. Statistical significant was considered at p-value <0.05 while high significant statistically at p-value <0.001 .

Results :

Table (1) shows that, slightly more than one quarter (25.7 %) of the studied nurses were aged between 20<25 years old with mean 30.11 ± 4.70 years. Concerning gender, the majority(92.9 %) of nurses were females. According to level of education more slightly than two fifth (41.4%) of them had Technical Institute of Nursing.

Table (2) illustrates that, the majority (84.3) of the studied neonates were less than 7 days of age. Regarding to their gender, more than half (57.1%) of the studied neonates were females. According to type of delivery, more than two thirds of the studied neonates (70%) had been delivered by caesarian section. Also, this table clarifies that, less than half (48.6 %) of them were $2000 \geq 2500$ grams of weight with mean 2740 ± 0.59 grams and the mean of their length was 50.36 ± 3.17 centimeter.

Figure (1) clarifies that less than half (44.3% & 42.8%) of the studied nurses had good and average level of knowledge respectively. While, the minority (12.9%) of them had poor total level of knowledge regarding venous sampling withdrawal.

Figure (2) clarifies that, the majority (81.4%) of the studied nurses had satisfactory level of practice about venous blood sampling withdrawal in neonates. While, the minority of them (18.6 %) had incompetent level of practice about venous blood sampling withdrawal in neonates.

Table (3) shows that, there was a statistical significant relation between the total level of knowledge regarding venous

blood sampling withdrawal and their gender, level of education, years of experience and training courses. while, there was no statistical significant relation between nurses' total knowledge and their age.

Table (4) clarifies that, there was highly statistical significant relation between nurses' total practice and their gender. There

is a statistical significant relation between nurses' total practice and their level of education and years of experience. While, there was no statistical significant relation between nurses' total practice and their age.

Table (1): Percentage distribution of the studied nurses' regarding their characteristics (n=70)

Nurses characteristics	No	%
Age in years		
Less than 20 years	10	14.3
20>25	18	25.7
25>30	14	20.0
30<35	10	14.3
35>40	10	14.3
40 and more	8	11.4
Mean ±SD	30.11 ± 4.70 years	
Gender		
Female	65	92.9
Male	5	7.1
Level of education		
Diploma of nursing	26	37.2
Technical institute of nursing	29	41.4
Bachelor in nursing sciences	15	21.4
Years of experience		
1≤5 years	35	50.0
6≤10 years	5	7.1
More than 10 years	30	42.9
Mean ±SD	8.00±4.49 years	

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Table (2): Percentage distribution of the studied neonates regarding their characteristics (n=70).

Neonates characteristics	No	%
1- Current age in days		
Less than 7days	59	84.3
7 ≥14 days	11	15.7
2- Gender		
Male	30	42.9
Female	40	57.1
3- Type of delivery		
Normal delivery	21	30.0
Cesarian section	49	70.0
4- Gestational age in weeks		
Less than 37 weeks	60	85.7
37 ≥42 weeks	10	14.3
5-Birth weight in grams		
1500 ≤2000	20	28.6
2000 ≤2500	34	48.6
More than 2500	16	22.9
Mean ±SD	2740±0.59 grams	
5-Current length		
Mean ±SD	50.36±3.17centimeters	

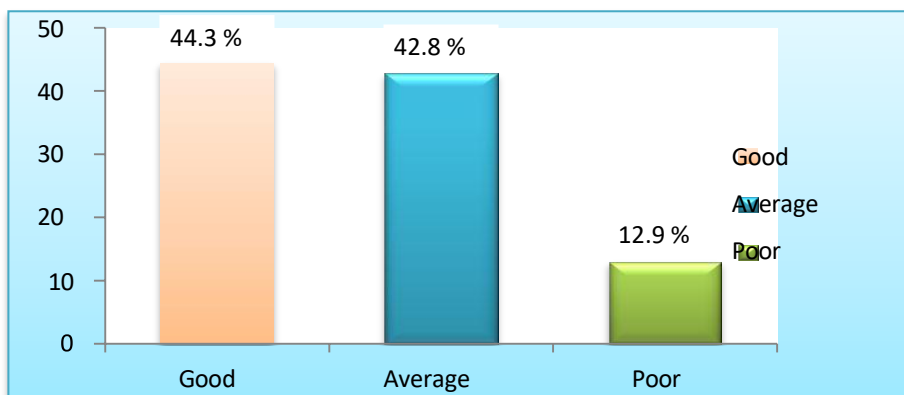


Figure (1): Nurses' total knowledge level regarding venous blood sampling withdrawal (n=70)

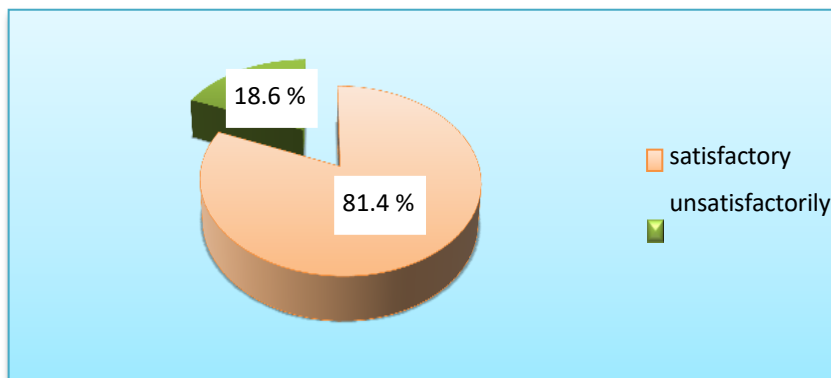


Figure (2): Nurses' total practices level regarding venous blood sampling withdrawal (n=70)

Table (3): Relation between nurses' total knowledge level and their characteristics (n=70) .

Nurses' characteristics	Poor (n=9)		Average (n=30)		Good (n=31)		X ²	P-value
	No	%	No	%	No	%		
Age in years								
Less than 20 years	2	22.2	4	13.3	4	12.9	6.407	0.78
20>25	3	33.3	6	20.0	9	29.0		
25>30	1	11.2	7	23.3	6	19.4		
30>35	0	0.0	6	20.0	4	12.9		
35>40	1	11.2	3	10.0	6	19.4		
More than 40	2	22.2	4	13.3	2	6.5		
Gender								
Female	6	66.7	28	93.3	31	100.0	11.703	.003*
Male	3	33.3	2	6.7	0	0.0		
Level of education								
Diploma of nursing	3	33.3	18	60.0	5	16.1	12.64	.013*
Technical institute of nursing	4	44.4	8	26.7	17	54.8		
Bachelor of nursing sciences	2	22.2	4	13.3	9	29.0		
Years of experience								
1≥5 years	6	66.7	21	70.0	8	25.8	13.712	.008*
6 ≥10 years	0	0.0	2	6.7	3	9.7		
More than 10 years	3	33.3	7	23.3	20	64.5		
Training courses								
Yes	4	44.4	1	3.3	0	0.0	10.681	.005*
No	5	55.6	29	96.7	31	100.0		

(*)Statistically significant at p < 0.05

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Table (4): Relation between nurses' total practices level and their characteristics (n=70).

Nurses' characteristics	Incompetent (n=13)		Competent (n=57)		X ²	p-value
	No	%	No	%		
Age in years						
Less than 20 years	2	15.4	8	14.0	2.099	0.835
20>25	4	30.8	14	24.6		
25>30	3	23.1	11	19.3		
30>35	2	15.4	8	14.0		
35>40	2	15.4	8	14.0		
More than 40	0	0.0	8	14.0		
Gender						
Female	8	61.5	57	100.0	23.609	.000**
Male	5	38.5	0	0.0		
Level of education						
Diploma of nursing	10	76.9	16	28.1	11.521	.003*
Technical institute of nursing	3	23.1	26	45.6		
Bachelor of nursing sciences	0	0.0	15	26.3		
Years of experiences						
1≥5 years	12	92.3	23	40.4	12.564	.002*
6≥10 years	1	7.7	4	7.0		
More than 10 years	0	0.0	30	52.6		
Training courses						
Yes	5	38.5	0	0.0	23.609	.000**
No	8	61.5	57	100.0		

(**) Highly Statistical significant at p<0.0 (*)Statistically significant at p<0.05

Discussion

Venous blood sampling withdrawal is a very common and important procedure for neonates at neonatal intensive care unit which can be performed in three forms as ; venepuncture, central venous catheter and umbilical venous catheter in every form, there are many indications for using it and also many precautions. Venepuncture is more accepted form of blood sampling in neonates. (**Clinical and Laboratory Standard Institute, 2017**).

As regards to characteristics of the studied nurses the present study revealed that more than, one quarter of the studied nurses their age ranging between 20 to 25 years. This finding was contradicted with **Mirlashari et al., (2016)**. who studied the "Clinical competence and its related factors of nurses in NICU" and mentioned that, more than half of studied nurses had the age between 30 to 40 years at Neonatal Intensive Care Units (NICUs). From the researcher point of view, newly graduates are appointed at NICU , so their number is large, but with age they shuttle between hospital departments.

Regarding characteristics of the studied neonates, the current study showed that, the majority of the studied neonates' current age had less than 7 days, this may be due to the fact that, most of them admitted to NICUs at the first day of delivery as most of them were suffering from respiratory distress syndrome. This finding is constant with **Abd- Alfatah, (2017)** who studied "Monitoring quality of nursing care for neonates in the first 24 hrs post extubation" and mentioned that, most of the studied neonates had the age less than one week. This is due to that any pulmonary distress is diagnosed in the first hours of life.

According to nurses' total

knowledge level, the present study illustrated that, less than half of the studied nurses had good level of knowledge about venous blood sampling withdrawal . This finding of the present study was consisted with **Zehra et al. , (2016)** who studied " Assessment of preanalytical blood sampling errors in clinical settings " and reported that, more than two thirds of the participant had adequate knowledge regarding blood sampling.

As regards total nurses' practice related to venous blood samples withdrawal, the current study illustrated that, the majority of studied nurses had satisfactory practice. This finding was consistent with **Atalla& Hendy, (2018)** who studied the "Effectiveness of structured teaching program on knowledge and practice regarding blood specimen collection among nurses" who reported that the maximum of the studied nurses had average practice score in pretest before program.

Concerning relation between total level of knowledge of the studied nurses and their characteristics. The current study revealed that there was statistically significant relations between nurses' knowledge and their level of education. These results weren't in agreement with **Ahlin et al., (2017)** who studied that "Assessing nursing students' knowledge and skills in performing venepuncture and inserting peripheral venous catheters, Nurse education in practice" who clarified that, no differences were found in demographic characteristics in relation to the results of the assessment of nursing knowledge and skills .

Regarding relation between total level of practice of the studied nurses and their characteristics, The current study find that

there was statistical significant relation between nurses' practice and their academic qualifications and years of experiences.

The findings of the current study agreed with **Mohamed et al., (2020)** who studied "Assessment of pediatric nurses' performance regarding intravenous therapy" and reported that there were statistically significance differences between the total level of practices and the socio-demographic characteristics.

Conclusion

Less than half of the studied nurses had good knowledge regarding venous blood sampling withdrawal and the majority of them had satisfactory practice. Also, there was a positive correlation between nurses' knowledge and their practice regarding venous blood sampling withdrawal.

Recommendations:

Developing periodic training programs for nurses regarding care of neonates undergoing venous blood sampling are recommended to update their knowledge.

Designing booklets for nurses working in NICU about practices of venous blood sampling withdrawal to enhance their performance.

Continuous evaluation for nurse's performance during venous blood sampling withdrawal provides them with the new in care and proficient performance to follow the high-quality standard of care.

Conducting an orientation program for newly appointed nurses, to provide them with information related to venous blood sampling withdrawal.

Further studies should be applied on nurses about venous blood sampling withdrawal in different settings

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معلومات وممارسات الممرضين تجاه سحب عينات الدم الوريدي عند الاطفال حديثي الولادة

آية عاطف حسين إبراهيم- باسمة ربيع عبد الصادق- راوية عبد الغني محمد

يعتبر سحب عينات الدم الوريدي من المهارات الضرورية خاصة في وحدات الرعاية الحرجة للاطفال حديثي الولادة لذلك فان دور الممرضين هاما حيث ان معلوماتهم و مهاراتهم تساعد في دقة النتائج بالتعاون مع اعضاء الفريق الصحى , وايضا يساهم الممرضين في تجنب او الاقلال من المشاكل التى تحدث عند سحب العينة, وتؤثر مهارة الممرض فى سحب العينة واتباع الاساليب الصحيحة على دقة النتائج وغالبا تتاثر خطوات سحب الدم الوريدي بالاطفاء ما قبل عملية السحب وتؤدى الى بعض المشاكل منها تاخر التشخيص , والعلاج , وايضا تكرار سحب العينة مرة اخرى. وقد اجريت هذه الدراسة علي 70 ممرض وممرضة بوحدة الرعاية المركزة للاطفال حديثي الولادة بمستشفى بنها الجامعى , حيث كشفت النتائج ان اقل من نصف الممرضين كان لديهم مستوى جيد من المعلومات وان الغالبية العظمى لديهم مستوى مرضى من الممارسات التمريضية الخاصة بسحب عينة الدم الوريدي فى الاطفال حديثي الولادة , ايضا توجد علاقة ايجابية ذات دلالة احصائية بين معلومات وممارسات الممرضين تجاه سحب عينة الدم الوريدي من الاطفال حديثي الولادة , كما اوصت الدراسة تطوير برامج تدريبية للممرضين القائمين برعاية الاطفال حديثي الولادة الذين يخضعون لسحب عينات الدم الوريدي لتحسين معلوماتهم وممارساتهم , وتصميم كتيبات للممرضين العاملين بوححدات العناية المركزة للاطفال حديثي الولادة عن ممارسات سحب عينات الدم الوريدي للممرضات لتحسين ممارساتهم تجاه سحب عينة الدم الوريدي فى الاطفال حديثي الولادة , والقيام بدراسات مستقبلية اخرى لتقييم الممرضين تجاه سحب عينة الدم الوريدي فى مؤسسات صحية اخرى