

Research Article

Impact of Supervised Phlebotomy Training Programme on Performance Skills of Phlebotomy Staff

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Abstract |

Background: Phlebotomists with proper knowledge and skills are of significant importance in health care system. Improper training of phlebotomy staff can result in false patient laboratory results leading to improper diagnosis and also expose the laboratory staff to various health hazards.

Objective: Objective of this study was to improve the knowledge and skills of laboratory staff(phlebotomists) by inducing a training course of phlebotomy.

Methodology: It was a quasi experimental study conducted in the Department of Pathology, Central Park Medical College from Feb 2016 to March 2017. A total of 80 participants were selected from Central Park Teaching Hospital (CPTH), Lahore and Bhatti International Teaching Hospital (BITH), Kasur who were involved in phlebotomy and all of them were enrolled in a phlebotomy training course. A pre-test was taken before the commencement of course and the score was compared with the post-test after the completion of training course. Also the number of pre-analytical errors (six months data) recorded before starting the training was compared with the number of pre analytical errors (six month data) after completion of the training course.

Results: Our study revealed that there was a significant reduction in the number of pre analytical errors recorded in the pathology laboratories of CPTH and BITH after training of the phlebotomy staff.

Conclusion: This study indicated that the proper training of the phlebotomy staff creates a positive impact on the technicians improving their skills and knowledge leading to improvement in the overall laboratory performance and the quality assurance.

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Introduction

In this era of medical practice, the number of patients seeking advice for their medical issues is growing on every day basis. With this increasing figure, the number of clinical investigations and medical tests being offered to the patients are also

increasing. Subsequently there is an increasing need for technicians to perform these laboratory tests for proper diagnosis and timely initiation of therapy.

Blood examination is one of the most essential components of these laboratory tests and the technician involved in collection of blood samples

from patients through venipuncture, arterial puncture or micro techniques is called phlebotomist.⁽¹⁾ For proper clinical diagnosis, blood examination plays a vital role and accurate results are directly related to proper sample collection, sample transportation and storage along with the skills of phlebotomist. Also, the phlebotomy technician is often the only direct contact of the patient with clinical laboratory.⁽²⁾ Proper knowledge and training of phlebotomist is of utmost importance because any negligence in the standard operating procedures of phlebotomy can result in false results, subsequently leading to faulty diagnosis, treatment and can also harm the patient emotionally and physically.³ Besides all this, poor knowledge and improper training of phlebotomist can also expose the laboratory staff and health care professionals to the risk of infectious diseases.⁽³⁾

Among the errors caused by poor knowledge and skills of phlebotomists, the majority lie in the category of pre-analytical errors.⁽⁴⁾ These errors comprise the initial steps of laboratory testing procedures, often performed by the technicians or health care personnel beyond the direct control of laboratory. These pre-analytical errors arise during the stages of patient preparation, sample collection steps, sample transport to the clinical laboratory and sample storage and preparation.⁽⁴⁾

In Central Park Teaching Hospital (CPTH) and Bhatti International Teaching Hospital (BITH), the nursing staff is involved in collection, labeling and transportation of samples to clinical laboratory. On daily basis, the pathology laboratory receives almost 120-150 samples for analysis. To improve the efficiency of pathology department, a complaint register is maintained which includes the detail of test, name & Medical Representative (MR), number of patient, ward and nature of error. In our practice, majority of these errors are pre-analytical in nature. The complaint is registered, recorded and informed to the concerned ward to repeat the sample or correlate clinically.

The laboratory data from 15 February 2016 to 15 July 2016 showed that the number of pre-analytical errors was increasing. These pre analytical errors were regarding sample collection, storage, transportation and labeling while receiving samples from the nursing staff of clinical wards. To overcome this

increasing number of pre-analytical errors, the Head of Pathology Department CPTH designed a phlebotomy course for training of the nursing staff of this hospital. The impact of this phlebotomy training course on the number of complaints regarding the pre-analytical phase of analytical testing was studied before and after commencing this training. The training program was designed according to the World Health Organization (WHO) guidelines of drawing blood. WHO standard practical guidance, on blood sampling systems was used to train the staff of CPTH and BITH.⁽⁵⁾ Following standards were kept in mind for training of the staff according to WHO recommendation guidelines of phlebotomy training:⁽⁵⁾

- In service training supervision was provided
- Training program provided theoretical and practical knowledge in the domain of blood sampling and blood drawing.
- Information was given regarding infection prevention and control procedures.
- A competence certificate was awarded to every candidate after completion of this training program.

Methods

This was a quasi-experimental study designed to compare the performance of staff before and after the commencement of training program. The nursing staff of CPTH and BITH (involved in phlebotomy procedure) in medicine and pediatric ward was enrolled in the study. A total of 80 nurses were selected and divided into two equal batches. Each batch was offered a training course, comprised of 6 lectures along with practical demonstration and practice completed in a period of one month (according to WHO guidelines on blood drawing). Lectures were based on basic phlebotomy techniques, sample collection guidelines (Chemical Pathology, Microbiology and Hematology), types and purpose of vacutainers, safety precautions and effects of hemolysis and improper transportation on test results along with sample rejection criteria of clinical pathology laboratory. Practical demonstration was performed on model and each candidate was given a chance to practice. A pre-test and post-test was taken

before and after the test respectively. The test included 50 questions regarding basic knowledge about phlebotomy technique, vacutainers and their usage, sample handling, safety precautions and disposing off contaminated equipment in the clinical laboratory. The training course of these two nursing batches was started from 15 August 2016 to 16 October 2016 (each batch was trained for one month). Also six month data (19 October 2017 to 20 March 2017) of the number of complaints due to pre-analytical errors was recorded after the completion of course. This data was compared with the six month data recorded from 15 February 2016 to 15 July 2016, before the training started.

Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) 23.0. The pre-test and post-test scores of the nursing staff and number of complaints recorded before and after commencement of the course were compared using

Table 1: Pre-analytical Errors Recorded in the Pathology Laboratory Before and After Phlebotomy

Complaint	Before Training (15Feb2016 to 15July2016)	After Training (19Oct 2017 to 20 March2017)
Improper labeling	68	22
Hemolysis	54	24
Delayed transport to lab	58	18
Sample in inappropriate vacutainer	66	23
QNS	78	32
Patient preparation fault	24	10
Lost/not received sample	71	30
	Total Number: 419	Total Number: 159
	P-Value	0.001

t-test. The purpose of this study was to compare the performance of nursing staff in the test taken before and after the training program and to evaluate the impact of training course on the phlebotomy staff regarding improvement in their knowledge and practice of phlebotomy.

Table 2: Comparison of Pre-test and Post-Test Scores of the Candidate Enrolled in the Phlebotomy Course.

Category	Total Number of Candidates Appeared	Mean Score (Total Score 50)	SD	P-Value
Pre-test	80	17.6	1.8	<0.001
Post-test	80	40.5	2.5	

Table 3: Percentage of Correct Answered Questions Before and After Phlebotomy Test.

Topics	Percentage of candidates who gave correct answer(pre-test before training)	Percentage of candidates who gave correct answer(post-test after training)
Phlebotomy techniques	44%	95%
Vacutainers(types and uses)	16%	94%
Order of draw	22%	87%
Safety precautions	60%	85%
Sample transportation	21%	89%
Patient preparation	16%	67%
Vessel anatomy, basic blood physiology	20%	87%
Sample collection guidelines	16%	88%

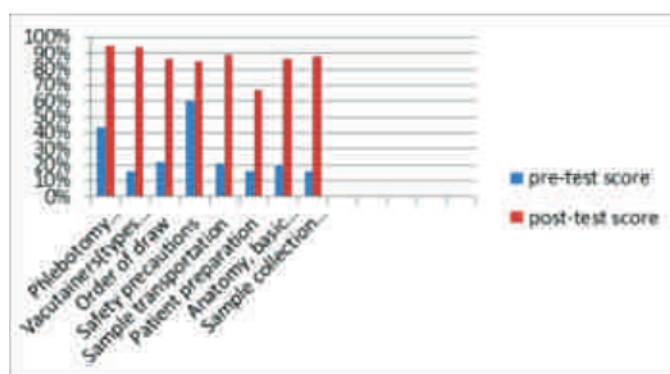


Figure 1. Graphical Representation of Percentage of Correct Answered Questions Before and After Phlebotomy Test

Results

Comparison of number of pre-analytical errors showed a significant reduction in number after the commencement of phlebotomy training. Percentage of test score increased significantly after training. (Table 2,3 and Figure 1).

Discussion

In our setting, phlebotomy is done usually by the nursing staff present on duty in the clinical wards. There is no proper phlebotomy training course for the nursing staff in their academic curriculum and this training is done mainly via theory and only a few observed blood draws.⁽⁹⁾ Poorly trained technical staff can lead to an increased number of pre-analytical errors.

In our study, the data of errors recorded in the lab over 6 months was studied and it was found that the

Table 4: Details of Phlebotomy Course

Lectures	Contents
Lecture #1	Basic phlebotomy techniques (supplies, equipment, procedure, anatomy)
Lecture #2	Vacutainers and their uses, order of draw
Lecture #3	Sample collection CPSL guidelines for microbiology and histopathology
Lecture #4	Introduction to CPSL guidelines for hematology and chemical pathology
Lecture #5	Introduction to new techniques(Guthrie card, Accuvein)
Lecture #6	Safety precautions in clinical laboratory
Practical #1	Practical demonstration venipuncture and arterial puncture
Practical #2	Practical demonstration heel prick and capillary puncture

number of pre-analytical errors was 419. These errors included poorly labeled samples, wrong patient ID, hemolysed samples, missed or delayed samples and use of inappropriate vacutainer (Table 1). Among all of these errors, insufficient quantity of samples sent for analysis was the error which was recorded in a greater number as compared to others (78 out of 419).

Two batches of nursing staff were trained for phlebotomy and sent back to their respective wards at the end of their training period (details of course in Table 3). Total 80 candidates were selected who were involved in sample collection in pediatric and general medicine wards. The training of first batch was completed in september 2016 and the second batch was completed in october 2017. The data for pre-analytical errors in the pathology laboratory was again studied for a period of six month after completion of training of two batches. Our study showed a significant reduction in the number of pre-

analytical errors recorded after the commencement of the course as compared to before training (p-value 0.001. Table 1). The number of complaints registered for improper labeling of samples were 68 in a six month period before the training period which was reduced to 22 complaints in six months after training (Table 1). Seventy eight cases of insufficient samples sent for analysis were recorded before training and this number was reduced to 32 after completion of training. Similarly, the number of other pre-analytical errors was also reduced considerably.

A pre-test was conducted before and after training course. The candidates involved had limited knowledge before training regarding basic phlebotomy techniques, types and usage of vacutainers, sample handling, collection of samples and precautions. This knowledge was improved significantly after training of staff. (Table 2,3 and Figure 1). A study conducted in India by Goswami et al showed similar results.⁽¹⁾ In this study, Goswami and his colleagues showed that the knowledge of phlebotomists improved after conducted training regarding laboratory safety.⁽¹⁾

In 2008, a stimulation clinical training program was conducted in Japan and trainees were questioned at the end of this program. The participants of this study showed a high satisfaction level with the training and also stated that their blood drawing technique was improved due to this training course.⁽⁶⁾ Bolenius et al conducted an educational intervention program for phlebotomists in Umea University of Sweden and investigated their experiences at the end of training through face to face interviews.⁽⁷⁾ The participants stated that the program had increased their awareness of laboratory risks and improved their practical knowledge and skills.⁽⁷⁾

In our study, the training program designed for the nursing staff involved in phlebotomy had a very positive impact on overall knowledge and skills regarding phlebotomy. The involved staff also applied this knowledge later on in their daily practice and this lead to a considerable reduction in the number of pre-analytical errors reported in pathology laboratory of CPTH and BITH.

Conclusion

In conclusion, the phlebotomy training program for the nursing staff had a very positive impact on their

overall performance and resulted in an improvement in laboratory overall function and quality assurance. The number of pre-analytical errors was decreased and subsequently the performance of Pathology Lab of CPTH and BITH improved. We recommend phlebotomy training program for technicians and nursing staff in hospitals and clinical laboratories so that correct reporting can be ensured, which will ultimately result in accurate and timely patient diagnosis. This training program is advised to be conducted both as a part of the curriculum of the paramedical staff and also before the beginning of their duties in the clinical wards and labs. This training program should be supervised by a well trained professionals and training course content should be designed according to the content published by WHO.⁽⁵⁾

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