QUESTIONNAIRE BASED ASSESSMENT ON PRE ANALYTICAL PHASE OF LABORATORY TESTING AMONG PHLEBOTOMISTS : KEY TO PATIENT SAFETY

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ABSTRACT

Background: Medical Laboratories plays an essential part in patient care management where most of the clinical decision are being made upon laboratory results. Sample integrity has major role in producing reliable laboratory results. Good pre analytical knowledge & practices are crucial in ensuring sample integrity. Laboratory may reject specimen if the specimen not fit to be processed in Laboratory.
Objective: To assess the knowledge of preanalytical phase of laboratory testing among phlebotomist in Hospital Bentong to ensure quality sample for laboratory processing.
Materials and methods: Questionnaire-based assessment on pre analytical phase of laboratory testing was conducted among 67 participants, who volunteered, over the period 14/08/2023 - 17/08/2023. The assessment consists of 15-item, multiple-choice questions (MCQs). The questionnaire was created include general knowledge on Total Testing Process, medicolegal aspect, patient preparation, sample transportation, sample collection & handling. Responses were analyzed as percentages of correct answer, unattempted and most common answer. These responses were categorized into less than 40% with correct answer, 40 to 60% with correct answer, and more than 60% with correct answer, so we could identify specific knowledge aspect which need training.
Statistical analysis: All the report were extracted from Quizizz platform & validated by Medical Laboratory Scientist.
Results: A total of 67 participants were included in the cross-sectional observational study. Total accuracy of the assessment is only 45%. Average of 37.33% of respondents have the basic knowledge on Total Testing Process & the three phases of Total testing Process. The knowledge of respondent in fasting requirement needed for sample testing is 53.5% while knowledge on specimen handling after collection is only 35.75%. Besides that, 61% of respondents well known of chain of custody form requirement for medicolegal cases. Only 66% of respondents aware of taking blood for patients on IV drips. According to the extracted data, 25 of 67 participants scored less than 30% while the other 25 out of 67 participants scored 50%-80%. Only 8 out of 67 participants scored 80%-100%.
Conclusions: Knowledge on pre analytical plays an essential role in quality assurance of laboratory results where it directly affecting the patient care & safety. Errors & risk associated in preanalytical phase account for the major reason behind erroneous or non-reliable laboratory results. Besides that, awareness of phlebotomist on importance of pre analytical steps in compliance with patient preparation, sample taking & handling are necessary in order to have quality samples for laboratory testing. Quality laboratory samples are the key for patient safety.

Key word: Pre Analytical, Laboratory Sample & Specimen Integrity

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INTRODUCTION

Medical laboratory has major role in health care especially in patient management. Medical laboratory has been recognized as playing crucial role in patient management where, evidence-based evaluation of laboratory test reports is essential in ensuring that patients receive safe treatment. According to clinicians in Germany and the USA, 60–70% of clinical decisions were made depending on laboratory test results [1] There are several types of patient samples such as blood, fluid, urine, swab sample & so on that can be tested in laboratory. Non laboratory staff will be involved in patient preparation prior to sample taking, selection of test according to indication, sample taking procedure & transportation of sample to laboratory. All this procedure stated above known as pre analytical phase according to Total Testing Procedure [2].

Total Testing Procedure consists of pre-analytical phase, analytical phase & post analytical phase, each of which phase has multiple steps [3]. Each step from Total Testing Process carries some risk of error thus need regular monitoring in ensuring patient safety [4]. Major errors, about 70% associates with pre analytical phase compare to the other two phases in Total testing Procedure is believed happened due to unavailable standard protocol on sampling taking & handling [5]. Thus, knowledge on specimen handling especially among phlebotomist is the major key in collecting quality samples for laboratory testing in determining accuracy of laboratory results for patient care.

Hospital Bentong is a district hospital in Pahang state of Malaysia which also categorized as minor specialist hospital. Emergency care, Pathology, Medical, Radiology, Surgical, Pediatrics & Orthopedics are among the specialist care in Hospital Bentong while Gynecology & Ophthalmology are on visiting based in SOPD clinics. The Laboratory of Hospital Bentong offers services such as routine Biochemistry, some specialized biochemistry test, routine hematology services which include Blood Banks services, some specialized hematology testing & basic microbiology testing. As overall, the laboratory receives average of 120,771 samples annually from various units/wards of Hospital Bentong & six healthcare clinics located in Bentong District. About 1.7% - 2% of the received samples are being rejected annually due to hemolysis, sample clot, lipemic, insufficient volume of sample, wrong use of container & wrong barcode or labelling in Hospital Bentong.

METHODS AND MATERIALS

This was a cross-sectional observational study conducted among phlebotomist in Hospital Bentong. The phlebotomist in Hospital Bentong were mainly from staff nurses, Medical Assistants & Medical Officers. All the phlebotomist were privileged by local settings. An online assessment link containing 15, multiple-choice questionnaire (MCQ) with questions related to process involves from laboratory sample collection, sample storage & sample transportation given to assess the knowledge base of 67 participants. Questions were pre validated and no time limits were given to respond via online Quizizz platform. The assessment narrowed to Average time taken to complete is 6 minutes 42 seconds. This MCQ consisted of the questions which focused on preanalytical variables like patient preparation (fasting and postprandial), sample collection, amount of the sample required, draw of order & laboratory specimen rejection criteria. Questions were objective and the participants need to identify correct answer. Responses were analyzed as percentages of correct answer, wrong answer, unattempted and most common answer. These responses were analysed further to group them into less than 40% with correct answer, 40 to 80% with correct answer, and more than 80% with correct answer. With this categorized analysis, will help in designing type of training to the phlebotomist

RESULTS

Table 1 shows question-wise response of participants. Average of 37.33% (Question 1,2 &3) of respondents have the basic knowledge on Total Testing Process & the three phases of Total testing Process. The knowledge of respondent in fasting requirement needed for sample testing (Question 6 & 8) is 53.5% while knowledge on specimen handling after collection (Question 10, 11, 12 & 14) is only 35.75%. Besides that, 61% of respondents well known of chain of custody form requirement for medicolegal cases (Question 7). Only 66% of respondents aware of taking blood for patients on IV drips (Question 15

In Diagram 1 score of participants in total has been illustrated according category of poor knowledge (less than 30%), below medium level of knowledge (30%-50%), average knowledge level (50%-80%) & good knowledge (more than 80%). According to the data, 25 of 67 participants scored less than 30% while the other 25 out of 67 participants scored 50%-80%. Only 8 out of 67 participants scored 80%-100%.

Table 2 shows categorization of topics based on questions which received maximum right answers to minimum. 6 out of 15 questions were received less than 40% accuracy while the other 6 out of 15 questions has accuracy of 40% - 60%. The remaining 3 out of 15 questions received accuracy of 60% -70% while no question recorded for accuracy of more than 70%. The least correct responses (less than 40%) were related to topics of General Knowledge on Total Testing. Process. Responses of 40% – 60% related to topics on Patient Preparation, Sample transportation, sample collection & sample handling.

GRAPHS AND TABLES

Table 1 Percentage of correct response of respondents by questions

Question Number	Percentage of correct response	Topics related	Unattempted
1	47%	General Knowledge on Total Testing Process	24
2	30%	General Knowledge on Total Testing Process	23
3	35%	General Knowledge on Total Testing Process	20
4	45%	Patient Preparation	25
5	47%	Patient Preparation	22
6	66%	Patient Preparation	21
7	61%	Medicolegal	24
8	41%	Patient Preparation	23
9	43%	Sample Collection & handling	20
10	36%	Sample Collection & handling	22
11	34%	Sample Collection & handling	20
12	38%	Sample Collection & handling	21
13	58%	Sample Transportation	23
14	35%	Sample Collection & handling	24
15	66%	Sample Collection & handling	25

Table 2 Categorization of question responses based on percentages with correct answer

	Percentage of Correct Answer			
	Less than 40%	40% - 60%	60 -70%	More than 70%
Number of Questions	2,3,10,11,12 & 14	1,4,5,8,9 & 13	6,7 & 15	No question

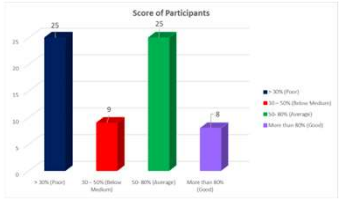

Diagram 1 Score of participants in total for Assessment on Pre-Analytical Phase of Laboratory Testing

DISCUSSION

The data analysis shown mixed performance of phlebotomist where 37.31% had average performance on pre analytical assessment & 37.31% had poor knowledge on pre analytical. Meanwhile only 11.94% of phlebotomists had performance of more than 80%. Besides that, 62% of respondent lacking in knowledge in draw of order. Non-compliance of phlebotomist in correct draw of order may lead to preservative contamination which may give erroneous laboratory result affecting in patient care [9].

Less than 40% of respondents gave correct answer for sample mixing & handling (Question 11 & 12). Sample mixing step is mandatory in order to prevent sample rejection by laboratory due to clot or hemolysis. Rejection of sample may cause delay in patient management & double up the cost [6]. Sample rejection of patient in critical care may increase mortality & morbidity rate as the clinicians need to wait for the results before making clinical decision in treating the patient. Rough handling of sample may cause vitro hemolysis. Hemolysed sample are not suitable to be processed as it may have falsely elevated potassium, lactate dehydrogenase (LDH) & aspartate aminotransferase (AST).

Certain routine biochemistry test requires fasting of patient in specific duration such as Fasting Blood Sugar (FBS) needs 6 to 8 hours fasting while Fasting Lipid Profile (FLP) needs 9 to 12 hours fasting. Question 8 in the assessment received only 41% of correct answer while 56% of respondent answered as 8 hours fasting needed for lipid profile. The remaining 3% of respondent answered as 4 hours of fasting. As overall, more than 50% of respondents have wrong knowledge on fasting requirement. This is because post prandial triglyceride remains elevated for several hours in blood stream [10]. Insufficient fasting may contribute to falsely high LDL because the calculation of LDL required fasting triglycerides according to Friedewald equation. Falsely high LDL & triglyceride causing unnecessary drug utilization in patient underlying cardiovascular risk which gives negative impact in patient care [8].

In a nutshell, performance of phlebotomist of Hospital Bentong on pre analytical knowledge were in category of average. This eventually will lead in rejection of sample by laboratory where unsuitable samples should not be processed as for patient safety. Therefore, specialised training needed to improve the knowledge & skill among phlebotomists in Hospital Bentong to ensure quality samples are send for laboratory testing. Mistakes during preanalytical phase are the major root cause for false laboratory result [7] [8].

CONCLUSIONS

Knowledge on pre analytical plays an essential role in quality assurance of laboratory results where it directly affecting the patient care & safety. Errors & risk associated in preanalytical phase account for the major reason behind erroneous or non-reliable laboratory results. Besides that, awareness of phlebotomist on importance of pre analytical steps in compliance with patient preparation, sample taking & handling are necessary in order to have quality samples for laboratory testing. Quality laboratory samples are the key for patient safety.

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