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RESEARCH ARTICLE

COMPARISON OF INCIDENCE OF PRE-ANALYTICAL PHASE ERRORS IN OPD AND IPD SAMPLES IN A SUPER-SPECIALTY HOSPITAL: A RETROSPECTIVE STUDY

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Abstract

Objective: To evaluate and compare the incidence of errors in pre-analytical phase in OPD and IPD samples. Multitude of human involvement in preanalytical processes makes this phase error prone. Analysis of the same can help in assessing the magnitude and planning the corrective steps.

Methodology: Study was conducted retrospectively for the period July 2019 to June 2020. Samples collected from OPD sample collection room and different areas of IPD were scrutinized for pre-defined errors. Number of errors in OPD and IPD were statistically compared.

Results: 679 samples out of 50713 (1.3%) OPD samples in the study period had one error or the other. Similarly, 1533 samples out of 87525 (1.7%) IPD samples had errors. When compared statistically, this difference is highly significant. ($p < 0.00001$).

Conclusion: IPD samples are more prone to errors for the fact that these samples are collected by nursing staff or resident doctors in the different areas of the hospital. This staff is involved in patient care and has to look after multiple tasks, hence chances of error are more. OPD samples are collected by the same team, who are trained phlebotomists and are in constant touch with lab. Thus OPD samples have less preanalytical phase errors.

Introduction:-

Lab tests and results are integral part of patient care. There has been a paradigm shift from clinical based judgements to evidence based medicine. Total testing process in a clinical biochemistry lab consists of three phases – preanalytical, analytical and postanalytical. Any error in any of these phases can compromise diagnosis and treatment, affecting patient care and outcome. Most of the analytical phase has been automated. Analysersare able to do self calibrations, run controls and flag any inconsistency. Post analytical phase is supervised by qualified biochemist. Preanalytical phase has the maximum variables at play and has maximum human involvement, making it to be the most error prone phase. 46-68.2% of total errors have been attributed to preanalytical phase. [1]. That makes this phase an important component of laboratory medicine. [2].Analysis of errors is the foremost step towards preventing them.

Aim:

Aim of this study is to determine frequency of errors in preanalytical phase of biochemistry tests and compare error incidence in OPD and IPD samples.

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Material and Methods:-

The present study was conducted retrospectively at a super specialty hospital during the period July 2019 to June 2020.

Blood samplecollection for biochemistry tests was divided into OPD and IPD. OPD samples were collected at one single point, sample collection room. IPD samples were collected from different inpatient areas of the hospital. IPD samples were collected by the staff deputed in their respective areas. All the staff were trained in the processes of phlebotomy and were made familiar with color coding of vacutainers.

All the samples were labelled with – patient name and unique hospital ID number [UHID] – for identification. Same were also mentioned on the requisition slip accompanying the sample. Additional data on requisition slip included list of lab tests to be performed, demographic data of the patient, diagnosis and other relevant information.

Following errors were noted, if present, at various stages of analysis:

1. Incomplete identification label on sample container
2. Wrong vacutainer
3. Incorrect quantity of sample
4. Haemolysed samples
5. Fluid mixed samples [From IV lines or same limb as with IV line]
6. Incomplete/ Error in requisition form accompanying the sample.

Numberof errors in various categories were noted separately for OPD and IPD patients were compared statistically.

Results:-

A total of 50713 samples were collected on OPD basis during the study period and out of these 679 (1.3%) samples were found to have errors in one of the defined categories. Distribution of errors in OPD was as per table 1.

Error	Number	%
Incomplete/ Error in requisition form	343	50.5
Incomplete identification label on sample container	169	24.9
Incorrect quantity of sample	114	16.8
Haemolysed samples	29	4.3
Wrong vacutainer	20	2.9
Fluid mixed samples	4	0.6

Table 1:-Frequency of Preanalytical errors in OPD samples.

Similarly, 87525 were collected in various IPD areas of the hospital and out of these 1533 (1.7%) were found to have errors as per predefined list.

Distribution of errors in IPD was as per table 2.

Error	Number	%
Incomplete/ Error in requisition form	522	34.1
Incomplete identification label on sample container	314	20.5
Fluid mixed samples	239	15.6
Incorrect quantity of sample	235	15.3
Haemolysed samples	139	9.1
Wrong vacutainer	84	5.5

Table 2:-Frequency of Preanalytical errors in IPD samples.

Total number of errors in OPD and IPD were compared with Chi Square as per table 3.

	Error Frequency	Total Number
OPD	679	50713
IPD	1533	87525

Table 3:-Distribution for Chi Square test.

Results of Chi Square test:

Chi Square: 33.6578

$p < 0.00001$ at 0.05

Highly significant

When compared statistically, incidence of preanalytical errors in IPD samples was significantly higher than OPD samples.

OPD samples had overall rate of preanalytical errors of 1.3%. Most common error was incomplete requisition form or form with errors. This constituted 50.5% of total errors. Next common error, 24.9% of total, was incomplete label on container. This was followed by incorrect quantity of sample and constituted 16.8%. 4.3% samples were hemolysed, 2.9% were in wrong container and 0.6% had fluid mixed in them.

Preanalytical phase error incidence was 1.7% in IPD samples. Most common error,34.1%, in IPD samples was incomplete of error prone requisition form. 20.5% samples had incomplete label on the container. 15.6% samples were mixed with intravenous fluids. Inadequate quantity was found in 15.3% samples, 9.1% samples were hemolysed and 5.5% samples were dispatched in wrong container.

Discussion:-

A lot of emphasis is being placed on pre analytical phase errors in a biochemistry lab. It is this phase that has the maximum human involvement and maximum variables that can lead to errors. This study was devised to compare the incidence of pre analytical phase errors in OPD and IPD samples.

Results indicate that there is statistically significant higher rate of errors in IPD samples as compared to OPD samples. This finding can be attributed to the fact that OPD sample collection center is manned by same team of lab technicians and are basically extension of lab team. Same team doing the same job full time results in lesser errors. IPD samples are collected from different areas of the hospital. These samples are collected by nursing staff or resident doctors and are just a part of their vast job responsibilities. Hence, the chances of error are more.

Results in Lee NY study showed that 97.6% errors in preanalytical phase occurred in IPD samples as compared to 2.4% in OPD samples. [3]. The difference was statistically significant, a finding similar to present study.

Singh K, Singh AK had similar findingsin their study. [4]. Percentage of preanalytical phase errors in OPD samples was 0.6 as compared to a figure of 2.2% in IPD samples. They suggested the same reason for the difference – same team of phlebotomists in the OPD as compared to different team members in IPD who are not trained in lab practices.

In the study conducted by Patel K, incidence of errors in preanalytical phase in OPD samples was 1.4% as compared to 2.05% in IPD samples. [5]. As a remedy, it was suggested to establish excellent communication and cooperation amongst all the stakeholders including the person collecting the sample and lab staff.

Bandyopadhyay D, Mukherjee K, Banerjee S in their study found preanalytical phaseerrorsto the tune of 93.6 per thousand in OPD samples as compared to 141.8 per thousand in IPD samples. [6]. This finding of more errors in IPD samples is same as the present study.

Arul P, Pushparaj M, Pandian K, Chennimalai L et al in a similar study found frequency of preanalytical phase errors to be 0.35% in OPD samples as compared to 0.52% in IPD samples. [7]. They attributed higher frequency of errors in IPD samples to the fact that many of IPD staff involved in sample collection were not aware of the importance of proper techniques.

Bharat V, Tiwari G, Bansal R and Gupta BK in their study recorded 1.4% (510 out of 36200) preanalytical phase errors in OPD samples and 3.75% (1080 out of 28800) in IPD samples. [8]. Preanalytical phase errors were seen

mostly in IPD patients. Rate was significantly higher as compared to OPD samples, a finding similar to present study.

Preanalytical phase errors were found to be higher in IPD samples as compared to OPD samples in a study conducted by Kale S, Gumber R, Mahajan M and Mulay S. [9]. Out of all preanalytical errors, OPD errors contributed 26.4% and IPD errors contributed 73.6%. Findings of the present study conform with these findings.

Upreti S, Upreti S, Bansal R, Jeelani N and Bharat V in their study found higher rate of preanalytical errors in IPD samples as compared to OPD samples. [10]. Incidence of preanalytical errors in IPD samples was 1.34% and that in OPD samples was 0.69%. These results are similar to the results of the present study.

Conclusion:-

Identification of a problem is the first step towards finding a solution. It has been widely accepted that most of the errors in a biochemistry lab occur during the preanalytical phase. Further analysis as in the present study and other similar studies has established the fact that such errors are more frequent in IPD samples as compared to OPD samples. Higher incidence of errors in IPD samples can be attributed to varied number of personsinvolved in collecting samples. These persons are engaged in other patient care activities also. Better training of IPD staff and improved communication with lab staff can be one solution to this problem.

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