

Evaluation of Specimen Rejection rate in Hematology Laboratory.

Dr. Alpeshpuri P. Goswami *, Dr. Sher Sankar Roy **,
Dr. Nutanbala N. Goswami ***

*Associate Professor in Pathology, **Resident Doctor in Pathology, ***Associate Professor in
Pharmacology, Govt. Medical College, Bhavnagar-364001

Objective: To calculate the rate of rejected specimens received in hematology laboratory stratified by area of collection and reason of rejection.

Design: Retrospective study conducted at Sir T General Hospital and Govt. Medical College, Bhavnagar, for twelve months period; January 1, 2013 to December 31, 2013. Data were retrieved from the laboratory records.

Results: The rate of specimen rejection was highest in the medical ward and clotted specimens were the commonest cause for rejection followed by wrong patient identification.

Conclusion: A constellation of factors, mainly related to phlebotomy technique and wrong patient identification are the reasons for rejection of specimens in the hematology laboratory. The phlebotomy technique may be wrong, there may be lesser efficiency of the staff in phlebotomy and inability of correct patient identification maybe reasons for this observation.

Keywords:

Hematology

Anticoagulant

Rejection

Phlebotomy

I. Introduction

Sir T General Hospital and Govt. Medical College, Bhavnagar, is a government hospital, licensed for 780 beds. Care of the patient is administered as services for outpatient and inpatients as tertiary level hospital. Laboratory services are administered on routine and emergency basis. The hematology laboratory is one of the sections of laboratory services of hospital. The laboratory offers both inpatient and outpatient testing. Blood is either collected from the various wards for indoor patient and there is a separate blood collection area for outpatients. The medical laboratory is working for 24 hours / 7 days. A properly collected blood specimen is essential for quality performance in the laboratory. Hematology testing is performed on whole blood. ⁽¹⁾

The laboratory data from a submitted specimen is reliable only if the specimen is adequately collected, labeled and transported to the laboratory in a timely fashion.

In our laboratory manual, in order to accept a specimen, it must meet the following criteria:

1- Must be collected in the correct specimen container, LAVENDER TOP K2 EDTA anticoagulant vacutte for CBC, Reticulocyte count, AEC

2- Must be legibly identified.

The following information must be legibly recorded on a label & affixed in an irreversible fashion to the specimen container:-

- Patient's full name
- Medical Registration number
- Date and time of specimen collection
- Specimen source
- Signature/ initials of doctor

As soon as a blood specimen is withdrawn from a patient, it is mixed with an anticoagulant to prevent coagulation. The anticoagulant used for routine hematological tests is K2EDTA where coagulation is prevented by the binding of calcium in the specimen to sites on the large EDTA molecule, thereby preventing the participation of the calcium in the coagulation cascade. ⁽²⁾

II. Objectives:

Hematology specimens brought to the laboratory may be rejected if conditions are present that would compromise the validity of the test results.

Criteria we follow for specimen rejection at hematology department are the following:-

1. Improperly filled forms
2. Improperly labeled samples
3. Inadequate quantity of sample
4. Clotted sample
5. Spill over of sample
6. Haemolysed sample
7. Sample received after 4 hrs of collection
8. Inappropriate vacute
9. Excessive amount

III. Material and Methods

A retrospective study was conducted at the Central laboratory of Haematology section of Pathology Department of Sir T General Hospital and Govt. Medical College, Bhavnagar from January 1, 2013 to December 31, 2013. The data were retrieved from the laboratory records.

IV. Results

The total numbers of hematology samples as well as the number of rejected samples were collected. The areas of collection as well as the reason of rejection were recorded and the results were as follows.

Table No. 1 shows that overall rejection rate ranges from 0.17% to 4.68%. Highest rejections seen from Orthopaedic ward (4.68%). Followed by Critical Care Unit (4.59%), Surgical Ward(4.25%), Baby Medical Ward(3.5%), Skin(3.26%), Eye(3.03%) and Gynae & Obs(3.02%). Lowest rejection rate is observed in Labside collection(0.17%).

Table 1: Rejected Specimens - Site of collection

MONTH	REJEC	MEDIC	BM	SURG	CCU	ORTHO	G&O	ICCU	EYE	ENT	CAS	ID	LAB	SKIN	TBW	PSY
JAN'13	163	37	38	27	6	12	11	8	1	0	0	6	5	6	4	2
FEB'13	128	40	19	32	7	6	8	1	1	0	1	0	9	2	2	0
MAR'13	140	45	26	19	2	8	8	12	0	0	1	4	5	1	4	5
APR'13	128	42	24	21	3	6	7	1	0	2	0	7	7	1	6	1
MAY'13	108	32	9	20	9	2	11	9	0	1	1	4	4	0	3	3
JUNE'13	114	28	19	25	4	12	9	5	0	0	1	1	6	2	2	0
JULY'13	116	38	19	20	2	12	11	3	0	0	1	5	0	0	3	2
AUG'13	126	32	22	26	2	5	16	2	1	0	0	3	3	5	5	4
SEP'13	102	26	25	17	2	11	11	1	0	1	1	2	1	2	2	0
OCT'13	89	28	14	21	1	7	5	2	0	1	0	6	2	0	1	1
NOV'13	101	38	15	13	4	7	9	2	0	1	0	5	1	2	2	2
DEC'13	85	24	9	18	4	9	8	4	0	1	1	2	0	2	0	3
TOTAL	1400	410	239	259	46	97	114	50	3	7	7	45	43	23	34	23
Received	70477	16869	6804	6090	1002	2073	3777	2001	99	399	252	1560	25681	705	2121	1044
Rejec(%)	1.99	2.43	3.513	4.2529	4.59	4.68	3.02	2.5	3.03	1.75	2.78	2.88	0.17	3.26	1.6	2.2

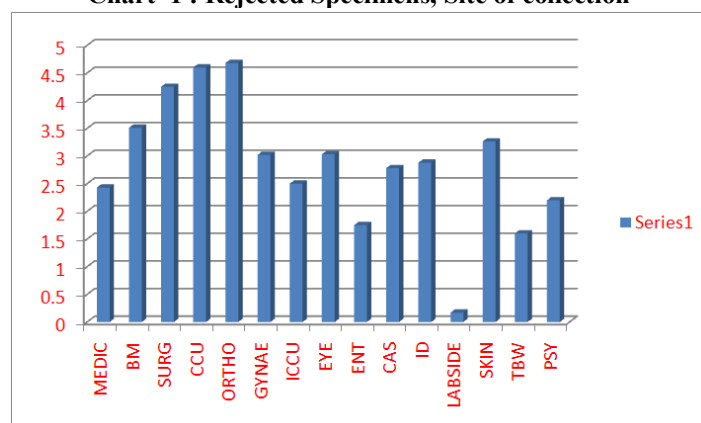
Table 2: Rejected specimens, Reason of rejection

Criteria	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Improperly filled forms (2%)	1	2	3	1	2	6	4	0	5	4	0	0
Improperly labeled samples (1.9%)	2	2	1	1	1	2	7	0	1	9	0	1
Inadequate quantity of sample (3.86%)	3	6	5	5	3	7	4	14	3	4	0	0
Clotted sample (78.57%)	148	104	120	94	75	73	71	92	90	68	100	65
Spill over of sample (3.07%)	1	1	0	8		10	8	7	1	2	2	3
Hemolysed Sample (7.64%)	3	5	7	13	19	12	14	4	1	0	3	16
Sample received after 4 hrs of collection (0%)	0	0	0	0	0	0	0	0	0	0	0	0
Inappropriate vacute (0.07%)	0	1	0	0	0	0	0	0	0	0	0	0
Excessive (3.57%)	0	0	1	6	8	10	12	9	1	3	0	0
Total	158	121	137	128	108	120	120	126	102	90	105	85
Grand Total	1400											

From table 2 it is seen that highest cause of rejection was clotted sample (78.57%). Other causes of rejection observed were haemolysed sample (7.64%), Inadequate quantity (3.86%), Excessive quantity(3.57%), Spill over of sample(3.07%),Inappropriately filled forms(2%), Inappropriately labeled sample(1.9%) and lastly Inappropriate vacute(0.07) respectively.

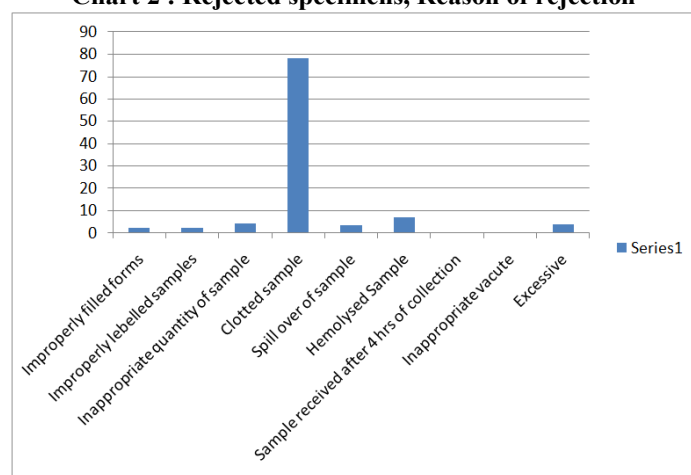
V. Discussion

Chart 1 : Rejected Specimens, Site of collection



The highest rate of rejection was from the Orthopaedic ward, Critical care and Surgical ward, it was less in medical ward. High rejection rate in sensitive ward like Critical care unit and Baby medical ward is worrisome for hospital. As this causes unnecessary wastage of valuable time which may be life-saving for those seriously ill patients as well as repeated sample drawing is cumbersome and deteriorates the already compromised situation of patients. Again Surgical and surgical oriented wards are having higher rejection rate than medical and medical oriented wards. At Labside collection center the rejection rate is minimal especially in respect to the largest no. of specimen they receive. This proves that proper training, guidance and supervised collection can help to attain efficacy as well as minimize these preventable errors which are beneficial to patients and physicians. The most common cause for rejection was clotted specimen (78.57%), followed by Haemolysed sample (6.93%). These are due to mainly unnecessary delay between collection, lack of proper mixing of sample and delay in submission of sample. Rejected samples because of inappropriate or low quantity (3.86%), excessive quantity (3.57%) or spill over of sample (3.07%) are mostly due to faulty technique by the staff collecting blood. Rejection due to improperly filled forms (2%), improperly labeled samples (1.9%) and inappropriate vacute (0.07%) are mostly due to carelessness or to get the job done hurriedly.

Chart 2 : Rejected specimens, Reason of rejection



VI. Review of literature

The role of clinical pathology and laboratory medicine continues to grow as the single largest component in day to day clinical practice as well as long term follow-up. The result of any laboratory examination becomes good enough only if appropriate samples received in the laboratory.

Many national and international programs to track laboratory quality have reported laboratory specimen rejection rates ranging from 0.3% in outpatient facilities to 0.83% in hospital based laboratories.⁽⁴⁾ It is known that approximately 56% of laboratory error occurs during the preanalytic phase (processes that occur before testing of the sample) of laboratory testing. In 1997 Jones et al reported that preanalytical errors constituted between 25% and 50% of the total errors in the clinical laboratory.⁽⁵⁾

Preanalytical errors are the responsibilities of the blood collector and include the following:⁽²⁾

- Monitoring of specimen ordering
- Correct patient identification
- Patient communication and safety
- Patient preparation
- Timing of collections
- Phlebotomy equipment
- Collection techniques
- Specimen labeling
- Specimen transportation to the laboratory
- Specimen processing

In this study, we chose the hematology laboratory for calculating the rate of specimen rejection stratified by the area of collection and the reason for rejection. The results point clearly to a defect in the phlebotomy technique in addition to wrong patient identification, which should be targeted throughout the hospital with special emphasis on the orthopedic and surgical ward, since the highest rate of specimen rejection was encountered from there.

Recommendations to solve such issue is to organize a team of phlebotomists as well as laboratory staffs in conjunction with the quality department with the target of creating a procedure manual to provide health care personnel with concise information on the proper techniques to collect quality blood specimens with minimal patient discomfort. So as to minimize the errors encountered in blood collection that can lead to unsuitable specimens eventually rejected when received in the medical laboratory.

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