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A STUDY OF QUALITY ASSESSMENT IN BLOOD BANK

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ABSTRACT

An essential element of health care systems is ensuring that everyone has access to safe blood, which is essentially the duty of the government or the relevant national health authority. In order to provide safe blood in India, multiple services must be planned, designed, implemented, and integrated holistically. In this research using the different method to data collection and analysis of data, develop a google form, face to face interaction with some doctors and nurses, using simple random sampling methods data collection methods, to create diagram and table Analysis, the data.

Keywords: *Quality Assessment, Blood Bank, Data Collection, Random Sampling, Table Analysis.*

Introduction

A key element of health care systems, ensuring that everyone has access to safe blood is essentially the responsibility of the national government or the competent national health authority. [1] To providing safe blood in India, a thorough planning, creation, implementation, and integration process is necessary. In 2015, there were roughly 2760 blood banks in India, and each year they collected 200–50,000 units of blood. Timely availability to safe blood is still an issue in many areas of the nation, and there is a considerable gap in the distribution of blood among various geographic locations. Uncertainty surrounds the quantity, distribution, and accessibility of India's annual blood collection to individuals in need of transfusions. The World Health Organisation (WHO) recommends that 100% of blood units be received by voluntary donation, quality-assured testing of donated blood, and improving blood transfusion facilities with evidence-based, creative, and goal-oriented procedures in order to guarantee that everyone has access to blood. Additionally, it's critical to maximise blood usage, develop efficient transfusion chain procedures, increase the staff, and create fruitful relationships. The primary bodies in charge of national blood transfusion services in India are the National Blood Transfusion Council (NBTC), which is the highest policy-making body, and the National AIDS Control Organisation (NACO), which is a part of the Ministry of Health and Family Welfare. Due to the fact that blood and blood products are regarded as pharmaceuticals, the Central Drug Standard Control Organisation (CDSCO) and state drug control organisations perform essential tasks like issuing licences and enforcing standards. procedures used in transfusion to ensure the safety and quality of blood and blood components in therapeutic settings. Even though India has a substantial network of both public and private blood banks, we lack current, comprehensive information about blood banks. exchange of blood. For evidence-based initiatives and policies to ensure quality, regular monitoring of blood banks is required in order to detect gaps and understand nonconformities. For this, assessments at the municipal, state, and regional levels are essential since coordination of blood transfusion services necessitates a national strategy. There hasn't, however, been a widespread initiative to examine blood banks. We assessed India's blood transfusion

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facilities, systems, services, practises, and performance because of its importance. (1) We used box plots, frequency distribution, and histograms to evaluate the data for outliers and extreme values. We used descriptive statistics like mean and standard error [SE] for numerical variables. The data had a normal distribution, therefore we used independent t-tests, ANOVA, and generalised linear models to compare the means of different variables. Between the number of blood banks per million people and the collection per 100 individuals, we performed a linear regression analysis. Statistical significance was defined as a P-value of less than 0.05. India's blood banks exist in two varieties: those with component separation facilities and those without. We developed numerous scoring criteria to distinguish between these two classes based on the technological requirements and projected deliverables. The technical requirements included (i)having a valid licence available, (ii) collecting annually in terms of units, and (iii) VNRBD, repeat donation, and pre- and post-test counselling services. (iv) Immunohematology, including IQC, EQA, and test procedures (v) TTI, which consists of IQC, EQA, and TTI testing procedures. (vi) The percentage of components that are separated and subjected to quality control (QC) (vii) QMS, which includes the presence of a medical officer with the required training and a staff nurse with NACO/NBTC certification. Each component's possible ratings could not add up to more than 100. The maximum score was the same for technical components including licence QMS and reporting for both types of blood banks.(2) Hospital blood banks typically give steps to ensure the compatibility of reagents and equipment a higher priority than similar controls on factors that may affect a technologist's performance. In typical sources on blood bank methodology, including the senior author's own work, a lot more pages are given to methods of evaluating the performance of "things" than to people. In the case of blood bank performance, where results are significantly influenced by the use of a semiquantitative approach, the requirement for manual skill, the application of judgement, and the capacity to evaluate data, it is unfortunate that laboratories have a tendency to measure the aspects of performance that lend themselves to surveys and statistical analysis. The director of the blood bank has a big responsibility to closely monitor the performance of his technical staff so that it is on par with the performance of his centrifuges and typing sera. This is because so much blood bank work is currently done in a relatively subjective manner, as opposed to, say, the objectivity of automated, computer-analysed testing in the clinical chemistry laboratory. (3)

Survey of External Quality Assessment Scheme for Blood Bank Laboratories in Taiwan

One of the main objectives of the External Quality Assessment Scheme (EQAS) established in Taiwan is to analyse the quality performance of laboratories on four various scales, including medical centres, regional hospitals, district hospitals, and commercial laboratories. Additionally, utilising EQAS as a monitor, a database of comparisons of laboratory quality performance and testing accuracy can be created. The inspections and evaluations of Taiwan's laboratories are greatly aided by this database. The performance of blood bank laboratories can be consistently improved with the support of internal quality control and an external proficiency programme. Due to the development of medical laboratory technology and equipment as well as the standardisation of blood banks testing procedures, the accuracy and quality of blood banks have significantly increased. The Taiwan Society of Laboratories Medicine (TSLM) has been allowed by the Taiwan Department of Health to conduct a Quality Assurance Surveillance Study on clinical laboratories (including blood banks) in Taiwan since 1994. However, participants have had to pay to join the programme since 2003, when the government stopped sponsoring the blood bank. Despite the suspension of funding, TSLM formed the Committee of Proficiency Test in Blood Bank Laboratory, which aims to advance the proper conception of quality control and enhance the functionality of blood bank laboratories in Taiwan. Conferences for continued education might be planned based on the EQAS results to increase the blood banks' level of expertise. This research gathered data from the EQAS for blood bank laboratory in Taiwan from 1998 to 2005 with the aim of discussing the proficiency of blood bank laboratories of various scales and strictly enforced accuracy requirements. District hospitals and private laboratories made up Group 2. The data displayed in this survey was gathered from 1998 to 2005. (3)

Review of Literature

According to Edwin Sam Asirvatham, India lacks comprehensive knowledge of blood transfusion systems, which might ensure that everyone has access to safe blood through evidence-based policies and initiatives. The performance of blood banks in India was evaluated for the first time on a nationwide scale by our team. In 2016, we performed a cross-sectional study of all 2626 blood banks to evaluate the operational, technical, and quality facets. In addition to descriptive analysis, we also used a generalised linear model, an independent t-test, or an ANOVA to compare the means of various variables. We conducted a linear regression analysis to compare the quantity of blood collected per 100 people with the

million-person blood bank population. Different groups show the mean scores for the quality management system and overall performance that have been decomposed. Also, we assigned a tertile classification to the performance, grading blood banks as poor, medium, or high performers. Of the 2493 blood banks that took part in the study, the majority (38%) were public or not-for-profit organisations, and 51% possessed facilities for component separation. A voluntary blood donation accounted for 72% of the 11.65 million units of blood that were collected each year. When a million individuals were counted, there were 2.2 blood banks, and each state collected blood at a rate that varied much from one unit per 100 people annually. (2)

Greendyke, Robert M., Wormer, Judith L., and Banzhaf, Jane C: Quality assurance in the blood bank. Studies of technologist performance. Am J Clin Pathol 71: 286-290, 1979.In order to evaluate how well blood bank technologists, perform routine tasks, a number of experiments were carried out. These included preparing erythrocyte suspensions, pipetting, interpreting hemagglutination, spotting weak alloantibodies, spotting mixed-field agglutination, and titrating and scoring antibodies. The authors come to the conclusion that a major portion of the accuracy problems in blood bank work are caused by the use of semiquantitative techniques. A plea is made for expenditure of increased effort in quality assurance programs directed toward the technical staff.(3)

Chuan-Liang Kao assessed the capabilities of blood bank medical laboratories in Taiwan. Long-term EQAS surveillance on blood bank laboratories from 1998 to 2005 was conducted and analysed in Taiwan. Only the laboratories that consented to take part in the system received the proficiency samples because participation in EQAS is voluntary. All participants were asked to follow the standard methodology for the testing. ABO grouping, RhD type, antibody screening, and identification are all options on the proficiency exam items. The accuracy rates of various test items, varying laboratory scales, and test methodologies were contrasted. The findings showed that the average correct ABO grouping rates are 98.7%, with ranges between 93.9% and 100%. RhD typing ranges from 90.6% to 100%, with a mean of 97.5%. Antibody screening and identification had average accurate rates of 88.6% and 97.1%, respectively. When compared to utilising a single method exclusively, using multiple methods for antibody screening increased the accuracy rates. Compared to medical centres and regional hospitals, the mistake rate of antibody screening was higher in district hospitals and private laboratories. By utilising EQAS, the blood banks' performance in Taiwan has reached a high level of competence, and the laboratories are able to maintain ongoing quality improvements for the blood transfusion service. It is advised that blood bank laboratories apply several antibody screening techniques on ambiguous samples to increase their accurate rates. EQAS is helpful for blood bank laboratories' quality control and the ongoing development of their competencies.(4)

John R.Hess came to the conclusion that the most visible sign of a failing RBC storage system is homolysis of red blood cells (RBCs) while being stored in blood banks. The biggest source of interunit variation, which makes analysis challenging, is donor-specific. The ability to do statistical analysis is made possible by the availability of data from national blood systems on sizable numbers of RBC units utilised for internal quality control. Measures of haemolysis during and at the end of storage on randomly selected donor unitsstored, and processed uniformly for (QC) purposes. These measures were grouped into histograms and compared statistically using units that had undergone similar processing and storage. A total of 14,087 measurements were collected under seven different storage settings, including more than 12,000 measurements carried out in one country under four closely comparable conditions. The percent haemolysis distributions are skewed normally, and the outliers are random. The 42 mmol/L mannitol in AS-1 appears to be equivalent to the normal 30 mmol/L mannitol in saline, adenine, glucose, and mannitol, but it actually reduces haemolysis, making additive solutions appear to be equivalent. Leukoreduction reduced observed haemolysis by 53% and raised it by 30% when storage was expanded from 35 to 42 days. Large national data sets provide useful information about the distribution of haemolysis at the end of RBC storage. This information can aid blood storage system development and regulatory science.(5)

Eric Wagner got to the conclusion that cord blood banks' (CBBs') data on graft characteristics are what should be used to choose a cord blood (CB) unit for allogeneic transplantation. The objective was to contrast the results of the graft characterisation obtained after freezing and washing with those offered by CBBs during selection. CB units have been examined both after thawing and before infusion using techniques that evaluate CB graft properties that are known to affect engraftment. In order to quantify the impact on engraftment and evaluate how CBB-supplied data can influence future CB unit selection, our results were compared to data offered by CBBs. There were differences in the kinds of information that the various CBBs offered. Additionally, differences were discovered between the data

provided by CBBs and the graft characterisation findings attained after freezing and washing. In several instances, CB metrics that were thought to be engraftment predictors were discovered to be significantly lower than what CBBs had reported. Additionally, there was observed to be variation between the data from CBBs and the graft characterisation outcomes attained after freezing and washing. When compared to measurements from thawed and cleaned CB units, CB readings that are known to be findings from CBBs usually have low correlation. Data show a considerable degree of diversity in graft characteristics produced by CBBs and frequently poor connection with results obtained on thawed and washed CB units. The total nucleated cell count, which is the primary CB graft selection criterion in addition to HLA matching, correlated favourably. To prevent unacceptably large disparities, we advise both CBBs and transplant centres to utilise standardised laboratory protocols designed to characterise grafts. (6)

Rashmi Tondon concluded that despite the variety of haemoglobin testing techniques available, no one approach has emerged as the most suitable and optimum for a blood donation setting. In a blood donation scenario, a prospective study was conducted using 1014 blood samples to evaluate the accuracy of four haemoglobin estimate techniques: the Haematology Cell Analyzer (reference), the HCS, the CuSO4 method, and HemoCue. HemoCue's mean value was 0.24 higher than the reference's (mean SD = 13.8 1.52 g/dl), but the difference was not statistically significant (P > 0.05). The results showed that HemoCue was the most accurate method (sensitivity: 99.4%; specificity: 84.4%); HCS was the most subjective, with a 25.2% error rate. CuSO4 showed good results, with a 7.9% false-positive rate. According to a comparative cost analysis, HemoCue costs 35 INR per test, HCS costs 0.76 INR per test, and CuSO4 costs between 0.06-0.08 INR per test. If stringent quality control is used, the CuSO4 technique produces accurate results. In a developing nation like India, HemoCue is too expensive to be employed as a primary screening tool.(7)

Hassan Al-Zubaidi came to the conclusion that information was gathered through empirical examination in a major blood bank. 354 blood donors were recorded using a SERVQUAL questionnaire. The study examined how blood donors are viewed and what is expected of them. The gap five scores were then calculated. The study discovers that all of the blood donors' gap (five) scores are positive, indicating that they are typically satisfied. Practical ramifications: In light of the findings, the administration of the central blood bank may take action to diagnose, evaluate, and spot areas where service quality can be improved. Through the use of the SERVQUAL model, this study aims to investigate the relatively understudied topic of evaluating the service quality of a central blood bank from the viewpoint of blood donor. (8)

Research Methodology

- **Method of Data Collection**

With the aid of my developed Google questionnaire forms, the information was gathered. Information on demographics, information sources, justifications for self-medication, and other topics were included in Google's questionaries. The study's target population received the forms in a random order. Before gathering this information from the populace, an ethical clearance was obtained.

- **Sample Design**

The survey was conducted over a 1-month period. Distribution of questionnaires was carried out throughout the day as per the convenience. Respondents were approached, informed and explained about the purpose of the survey in advance before they were given the questionnaire. The link of web Based questionnaire was sent through social media such as WhatsApp. Facebook and Instagram Respondents were students, Businessmen, doctors, teachers, service person, retired person and Homemakers. The age group was divided as 18-25, 25-30, 30-35, and Above

A total sample size of 150 to 200 was completed

- **Sources of Data**
  - **Primary Source of Data**

Given that the survey was conducted online using a Google questionnaire, which was distributed to the participants and contained many study-related items. As a result, several types of responses, such as "Yes" or "No" responses and responses expressed as percentages and ratios, were noted. And we also using to collect the data Informal Interviews and Observation.

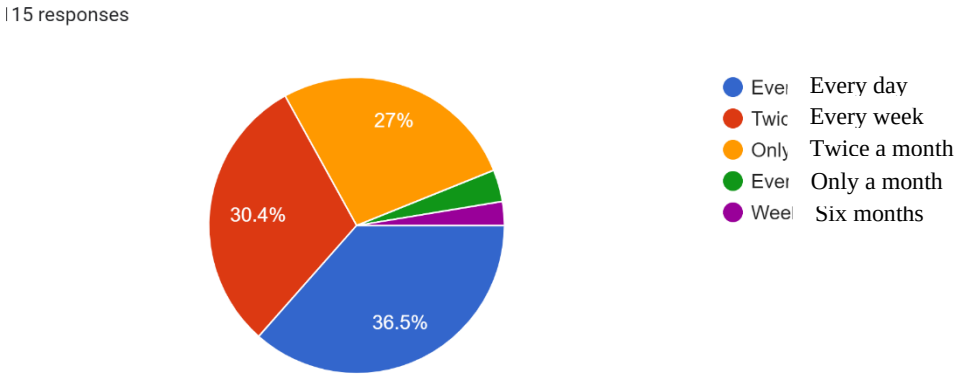
  - **Secondary Data**

To complete the project, secondary data is gathered from prior studies and published works. The secondary information was gathered using:

Data Analysis and Interpretation

How frequently are quality control measures performed in the blood bank?

Response	Frequency	Percentage
Every day	42	36.5
Every week	35	30.4
Twice a month	31	27
Only a month	4	35
Six months	3	2.6
Total	115	100%



- **Analysis**

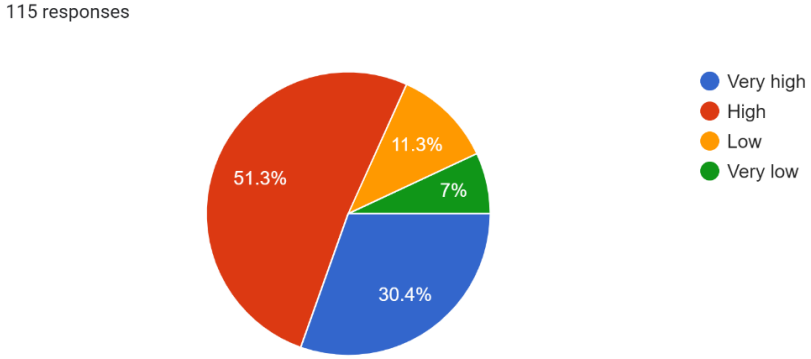
From the above diagram and table, it is observed that out of the total responses ie.115, 42 responders chose quality control measures performed in blood bank every day bases, 35 responders chose every week bases quality control, 31 responders selected twice a month, 4 responders selected and 3 responder select six months bases quality control measure in blood bank.

- **Interpretation**

It observed that more people selected the every day bases measure the quality control in blood bank, and other people chose different section for their experience in different organization.

What are the standard operating procedures for blood bank collection processing and storages?

Response	Frequency	Percentage
Very high	35	30.4
High	59	51.3
Low	13	11.3
Very low	8	7
Total	115	100%



- **Analysis**

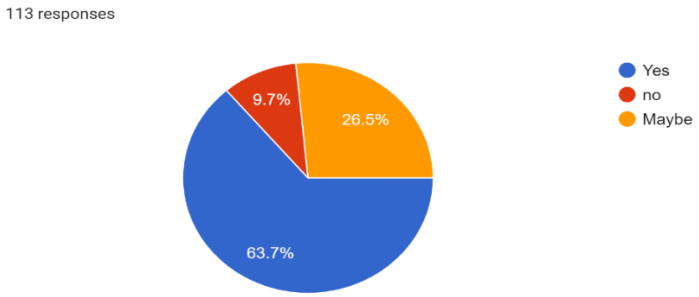
From the above diagram and table, it is observed that out of the total responses ie.115, 35 responders selected the standard operating procedures for the blood collection and storages, 59 responders chose high of standard operating procedure, and 13 person selected low and 8 responder was selected very low of operating procedure of blood bank to collection and storage of blood.

- **Interpretation**

It observed that standard operating procedures for blood collection and storages in blood bank is high according to the data and different responders has different point of view that's why they chose different options.

Are there mechanisms to monitor and evaluate the overall performance of the blood bank?

Response	Frequency	Percentage
Yes	72	63.7
No	11	9.7
Maybe	30	26.5
Total	113	100%



- **Analysis**

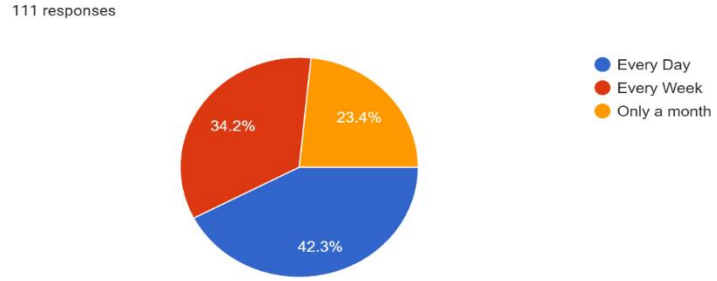
From the above diagram and table, it is observed that out of the total responses ie.113, 72 responder responses that blood bank has mechanisms to monitor and evaluate the overall performance, 11 people response that some blood bank has not any mechanisms, 30 people told that maybe in blood bank has mechanisms to monitor and evaluate the overall performance.

- **Interpretation**

It is observed that most of the respondent that in blood bank has mechanisms to monitor and evaluate the overall performance, and some people told that maybe or nothing in blood bank.

Are inspection and maintenance performed on equipment use in blood bank?

Response	Frequency	Percentage
Every day	47	42.3
Every week	38	34.2
Only a month	26	23.4
Total	111	100%



- **Analysis**

From the above diagram and table, it is observed that out of the total responses ie.111, 47 responder response that every day inspection and maintenance performed on equipment use in blood bank, 38 people response that every week to inspection of blood bank equipment, and 26 tolled that only a month to inspection of the blood bank equipment.

- **Interpretation**

Hear it is observed that most of blood bank are maintain the equipment in every day or weekly bases, and son response are only a month to maintenance performed on equipment use in blood bank.

Conclusion

- Through the study it is observed that the mostly blood donated in blood bank of the study of the age group 18-25 years.
- It is also observed that respondents from the sample during blood donation process your privacy maintain in the blood bank or any organization.
- It is also observed that in the blood bank quality control measures every day bases and some organization and blood bank weekly bases and twice a month to maintain the quality of blood.
- It can also be observed that the temperature of blood products monitoring and controlled most of the blood banks and organization are manually, in developing technology some them automatic to control and monitoring the temperature of the blood products in blood bank.
- It is also observed that most of the blood banks staff members are well trained and qualified to maintain the blood product and collection and handling the blood in a proper manners and labelling and tracking the blood products.
- It can also observe that in the blood bank errors are identified identify some organization or blood bank manually and some other one automatically.
- It can also observe that most of respondent blood bank equipment are maintenance and monitoring every day bases and few responded that every week to maintenance.
- It is also observed that many od the blood bank and organization don't have any proper biohazardous waste management, in this study observe that most of the organization have proper waste management system.
- And also observed that in the blood bank monitor the overall performance to maintain most of the blood bank and organizations.

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