

## ORIGINAL RESEARCH

# Revisiting Quality Indicators in Blood bank at a Tertiary care hospital: Paving way for Accreditation

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Received: 16 April, 2023

Accepted: 22 May, 2023

### ABSTRACT

**Aim:** To evaluate Quality Indicators laid by NABH and check the preparedness of our centre for accreditation. **Material & methods:** A retrospective study was conducted for One year from January 2022 to December 2022 in the blood bank at our hospital. Data was collected from blood bank registries. Detailed analysis was performed and all possible corrective actions were inculcated. **Results:** A total of 2547 donations was done over a period of one year with an almost 1:1 ratio for Voluntary to Replacement donors. The mean TTI% was 0.6%. The highest Wastage Rate was 5.6% in the month of march. The mean ATR% was 0.25% with a maximum rate of 0.8% in the month of August. Average TAT observed for emergency cases was 32.4 minutes while that for Routine cases was found to be less than two and a half hours with mean of 148.6 minutes. The QC failure for all the three components including PRBC, FFP and Platelets was found to be nil. The ADR's was found to be 1.26% with maximum cases of vasovagal syncope followed by hematoma. The mean DDR was approximately 12.2%. The mean C:T Ratio in the present study turned out to be 1.82. **Conclusion:** The overall performance of the blood bank at our tertiary care centre was found to be satisfactory. The study proved to be motivating in many aspects and the lacunae identified will be acted upon promptly.

**Keywords:** Quality Indicators, Accreditation

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### INTRODUCTION

Ever since the existence of mankind, Blood has been a precious commodity and needs to be utilized safely and judiciously. With the never ending need of blood and its components, blood transfusion services (BTS) has become an indispensable element over past few decades. However, the goal of BTS at any institution is not merely meeting the demands, but also providing zero risk efficient transfusion with minimal wastage that can be achieved through implementation of quality management systems (QMS).<sup>1</sup>

QMS uses Quality Indicators (QI) as tools instituted in an organization with motive to provide proof of the level of quality as well as utilizing information gained to seek improvements in the quality of performance.<sup>2</sup> Eleven QIs have been stated by National Accreditation Board for Hospitals and health care providers (NABH) as tools for assessing quality of BTS. Although, only

first five indicators have been mandated for accredited blood bank to monitor and report quarterly to NABH.<sup>3</sup> The present study was conducted with an aim to evaluate Quality Indicators and check the preparedness of our centre for accreditation in near future. The study will further help in reporting the outliers, localizing the loop holes and suggest for scopes of improvement.

### MATERIAL & METHODS

A retrospective study was conducted for One year from January 2022 to December 2022 in the blood bank at our hospital. Data was collected from blood bank registries. Detailed analysis was performed and all possible corrective actions were inculcated.

The QIs under study were derived by various formulae according to the NABH guidelines<sup>3</sup> given in Table no.1

**Table 1: QI's as per NABH guidelines**

1	Transfusion-Transmitted Infection (TTI%)	$\frac{\text{Combined TTI cases ( HIV + HBV + HCV + Syphilis + MP )} \times 100}{\text{Total No of Donors}}$
2	Adverse Transfusion Reaction (ATR%)	$\frac{\text{No. of adverse transfusion reactions} \times 100}{\text{Total no. of blood units/ component units transfused}}$
3	Wastage Rate (WR%)	$\frac{\text{No. of blood units/ components discarded} \times 100}{\text{Total no. of blood units/components collected}}$
4	Turn Around Time (TAT)	$\frac{\text{Sum of the time taken}}{\text{Total no. of times whole blood or component cross matched}}$
5	Component QC failures	$\frac{\text{No. of Components QC failures} \times 100}{\text{Total no. of components tested}}$
6	Adverse Donor Reaction (ADR%)	$\frac{\text{No. of Donors experiencing Adverse Reactions} \times 100}{\text{Total no. of Donors}}$
7	Donor Deferral Rate (DDR%)	$\frac{\text{No. of Donor Deferrals} \times 100}{\text{Total no. of donations + Total no. of deferrals}}$
8	Cross- match : Transfusion Ratio (C:T)	$\frac{\text{Total no. of blood units/components Cross- matched}}{\text{No. of blood units/ components issued}}$

**RESULTS**

A total of 2547 donations was done over a period of one year which included 1294 voluntary donations from camps and 1253 replacement donations with an almost 1:1 ratio for Voluntary to Replacement donors. Out of the total donations 2375 (93%) were male donors and 170 (7%) were female donors. A total of 2495 units were separated into components while the remaining units were either used as Whole blood or discarded due to seropositive status or low quantity of

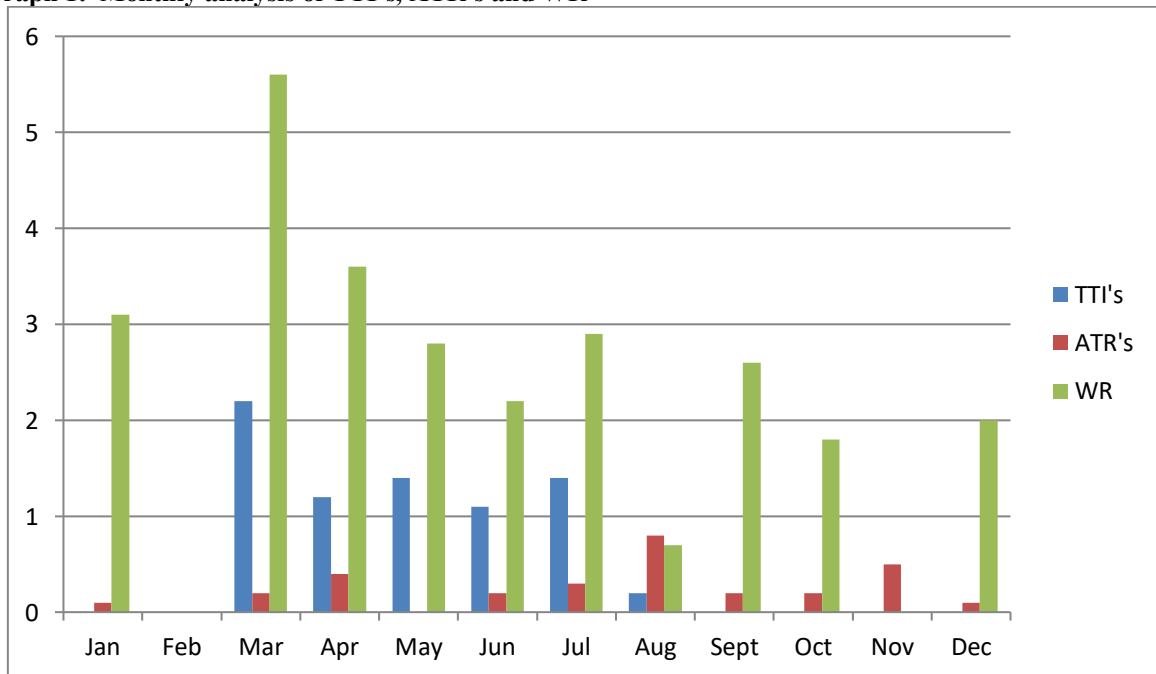
collection. All the eight QI's were calculated and systematically analysed.

It was observed that the mean TTI% was 0.6% with highest rate of 2.2% in the month of March.

The raised TTI% in the month of March probably contributed to the highest WR of 5.6% in the similar month however the mean WR was found to be 2.27%. No wastage of blood and its components was noted in the months of February and November.

The mean ATR% was 0.25% with a maximum rate of 0.8% in the month of August (Graph 1).

**Graph 1: Monthly analysis of TTI's, ATR's and WR**



Average TAT observed for emergency cases was 32.4 minutes while that for Routine cases was found to be less than two and a half hours with mean of 148.6 minutes.

The most eye catching finding of the present study was that the QC failure for all the three components including PRBC, FFP and Platelets was found to be nil.

The ADR's was found to be 1.26% with maximum cases of vasovagal syncope followed by hematoma.

The mean DDR was approximately 12.2%. Low haemoglobin followed by donors on long term medications was the commonest deferral criteria.

The mean C:T Ratio in the present study turned out to be 1.82.

## DISCUSSION

Each drop of blood is precious especially when it comes to treat life threatening cases. However, at times it is noticed that blood components are ordered without proper analysis of the real needs, thus wasting an important resource. Hence, it calls for a strict quality assurance program to ensure effective and safe BTS.<sup>4</sup>

QMS at any blood bank comes into play at each and every level starting from collection of the blood units to its transport, testing and analysis, preservation and storage to finally transfusion.

Since ours is a comparatively newer blood bank set up in the state of Uttarakhand, we have set a goal to achieve the NABH accreditation as early as possible and have been constantly making efforts to improve our blood bank services through regular academic activities and awareness programs, periodic assessment and training of our laboratory staff.

This audit was also conducted with the similar purpose of appraising our performance on basis of eight QI's defined by NABH.

The mean TTI% in our study was found to be 0.6% which was in concordance with the study done by Fernandes *et al.*<sup>5</sup> (2010) and Hariharan *et al.*<sup>6</sup> (2019). Other study by Zulfikar *et al* (2012) also showed similar results 0.82%<sup>7</sup> and Varshney *et al* (2017) 0.93%.<sup>8</sup>

Among the five TTI's tested at our centre, the highest seroprevalent was found to be Hepatitis B followed by VDRL and Hepatitis C. There was no case of HIV or Malaria.

The probable cause for a controlled TTI% may be a well trained dedicated pre donation counsellor at our centre. A good scrutiny to rule out professional donors is a must to maintain a low level of TTI positivity.

The raised TTI% in the month of March probably contributed to the highest WR of 5.6% in the similar month however the mean WR was found to be 2.27%. Concomitant findings were also noticed by Suresh *et al.*<sup>9</sup> (2015), Kaur *et al.*<sup>10</sup> (2016), and Varshney and *et al.*<sup>8</sup> where TTI positivity was the most common cause of wastage of blood units.

In the present study, the most common cause of increased WR following TTI positivity was found to be Expired blood components especially platelets due to short shelf life succeeded by low volume of blood units collection. Also, the whole blood collection stock should be kept to minimum to prevent expiry due to nonutilization, as it has got only limited indications these days.

No wastage of blood and its components was noted in the months of February and November probably due to an overall low collection of blood units during these months.

As a corrective measure, use of higher sensitive testing methods including ELISA and Nucleic acid amplification tests will be considered for screening viral markers even in the window period. Strict implementation of FIFO(First In First Out) policy has been started to avoid wastage due to expiry of components.

The mean ATR% was 0.25% with a maximum rate of 0.80% in the month of August 2022. The findings are slightly on higher side than those obtained by Bhattacharya *et al.*<sup>11</sup> (0.18%), Chakravarty-Vartak *et al.*<sup>12</sup>(0.16%) and Hariharan *et al.* (0.14%). Allergic reactions comprised major part of ATR's along with Non haemolytic febrile transfusion reactions.

For preventive actions, ATR's reporting forms have been circulated in all clinical departments so that the treating clinical can report back to the BTS for relevant work-up. Introduction of leuco-depleted blood bag sets have been put for consideration in near future, especially for patients of thallemia and others with indications for frequent blood transfusions.

Average TAT observed for emergency cases was 32.4 minutes while that for Routine cases was found to be less than two and a half hours with mean of 148.6 minutes.

	Emergency TAT (mins)	Routine TAT (mins)
Varshney <i>et al</i> (2017) (8)	29.87	135.82
Hariharan <i>et al.</i> (2019) (6)	27.61	143.56
Mukherjee <i>et al</i> (2022) (13)	28.50	141.38
Present study (2023)	32.40	148.6

Compared to the results of previously done studies as mentioned above both the emergency and routine TAT was on the higher side and needs to be monitored. A root cause analysis of the higher TAT revealed a limited manpower at blood bank which often gets split to cater both inhouse and field camp services. Hence a need to recruit more skilled technicians should be pondered upon. Moreover the currently employed

technicians should be trained to act promptly and be able to evaluate the emergency and routine blood unit demands accordingly. One senior technical staff may be designated to supervise and manage the work even at times of crunch so that the working of BTS goes on smoothly.

The positive finding of our study was the QC failure rate being the sole QI meeting our expectations. But

with the expanding blood demands and maintainance of similar standards will require constant vigilance.

The ADR's in present study was found to be 1.26% which was comparable with Varshney et al (2017) showing 1.15% (8) and lesser than Abhishekh et al (2013) showing 2.03%<sup>14</sup>. The maximum cases were of vasovagal syncope followed by hematoma.

In order to minimize risk of adverse donor events, Pre and post-donation counselling is mandatory.<sup>15</sup>

In context to the DDR, it was approximately 12.2% which was similar to Agnihotri et al (2010)<sup>15</sup> and Rehman et al (2012)<sup>16</sup> who reported their donor deferral rate to be 11.6% and 12.4% respectively.

However, few Studies showed a comparatively lower deferral rate of 5.12%, 9.3% and 8.99% reported by John et al (2015)<sup>17</sup>, varshney et al 2017(8), and Hariharan et al(2019) (6) respectively.

The commonest deferral criteria was Low haemoglobin followed by donors on long term medications which was similar to that reported by Hariharan et al.<sup>6</sup>

In order to minimize DDR, donor recruitment strategies needs to be modified with more rationalization of deferral criteria and counselling of deferred donors (16).

Despite a good amount of blood being voluntarily donated, it is the testing of blood after donation and the amount of manpower that is involved in the entire process which makes it so expensive, hence warranting judicious use of this precious lifesaving entity.

CT ratio of 2.5 or below is considered indicative of efficient blood utilization as conceptualized by Boral et al.(18)

The mean C:T Ratio in the present study turned out to be 1.82 which although is within desirable limits but can still be improved. It was higher than the values reported by Novis DA et al<sup>19</sup> and Hariharan et al<sup>6</sup> where

C:T ratio was 1.5 and 1.12 respectively.

Periodic conduction of CME's alongwith training of technical staff should also be done on priority basis.

Every hospital should have a hospital transfusion committee to monitor the rational use of blood and components and review the blood management system.<sup>20</sup>

## CONCLUSION

The key highlights emphasized on the need of regular audits of QI's in blood bank like the present study.

Active participation in the National Haemovigilance Programme of India will help strengthening QMS via proper documentation of ATR's. A well structured policy like implementation of First In First Out (FIFO) in BTS will help in reducing the rate of discard of blood bags due to expiry.

Well trained and skilled manpower should be available to issue blood and components by adhering to the TAT as per policy of the institution. The overall performance of the blood bank at our tertiary care

centre was found to be satisfactory in the study. Moreover it acted as a motivational step to identify the current lacunae and hence improve the services rendered.

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