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ANALYSIS OF THE NABH QUALITY INDICATORS IN THE BLOOD CENTRE OF A TERTIARY CARE HOSPITAL IN WESTERN RURAL INDIA

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Abstract

Background: Quality management system (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. We are monitoring the quality of our transfusion services using National Accreditation Board for Hospitals and Healthcare Providers (NABH) QI viz. Adverse Transfusion Reaction Rate (ATRR) %, Average Turnaround Time (TAT) for issue of blood and blood components, Transfusion transmitted infection percent (TTI%) and Wastage rate % (WR) of Blood Components (excluding discards due to TTI reactivity). This study was done to analyse these QIs, their impact on blood bank operations, and strategies to improve overall transfusion safety and efficiency.

Materials and methods: This was a retrospective analytical study conducted on all blood units donated within a period of two years from May 2022 to April 2024 and all blood component transfusions done during this period. Data was collected from Blood Centre records regarding blood donations, Blood requisitions and transfusions and adverse transfusion reactions.

Results: The overall TTI % during the entire study period was 0.64. The total number of units discarded due to TTI reactivity was 127. The wastage rate of components because of reasons other than TTI Reactivity was 1.94% with 325 discarded units. The total number of adverse transfusion reactions were 20 during the entire study period with the ATRR of 0.12%. The mean turnaround time (TAT) for the routine issues was 31.5 min and that for emergency supplies was 14.3 min in our study.

Conclusion: The analysis of these QIs has helped us identify the areas in which our services are satisfactory and the areas where we need to improve. In areas where we need to improve, we are trying to address the challenges associated with the QIs by continuous monitoring, process improvement and adoption of innovative technologies. Such analysis and continuous refinement of practices will help ensure the ongoing success of blood transfusion practices and improving quality of patient care.

Keywords: Quality Indicators, NABH, Transfusion Practices, Quality Management

BACKGROUND

Blood transfusion services are the essential and fundamental part of any healthcare system. The blood transfusion services should provide blood and blood products that are safe, potent, and effective. To provide a high level of assurance of safe blood and transfusion practices to blood donors, physicians, patients, and their families, a quality philosophy must be evolved in blood transfusion services. Bringing this quality philosophy into operation includes quality control, quality assurance, and continuous quality improvement.

The desire to achieve near zero-risk blood transfusion has led to implementing Quality management systems (QMS). 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 (1). In India, an accreditation agency, National Accreditation Board for Hospitals and Healthcare Providers (NABH), is monitoring the quality of blood centres using certain QIs. The blood centres are involved in NABH accreditation in two ways –one as a part of NABH accreditation Hospital and other one by exclusive accreditation of Blood centre alone (2). Our blood centre is involved in this process as a part of Hospital accreditation. Under this, two key performance indicators/QIs are monitored (2). These are –

1. Adverse Transfusion Reaction Rate (ATRR) %
2. Average Turnaround Time (TAT) for issue of blood and blood components

Along with these two, our blood centre is also monitoring the following QIs

1. Transfusion transmitted infection percent (TTI%)
2. Wastage rate % (WR) (excluding discards due to TTI reactivity)

The purpose of this study is to analyse these key QIs, their impact on blood bank operations, and strategies to improve overall transfusion safety and efficiency.

MATERIALS AND METHODS

Ethical committee clearance was obtained from the institutional ethics committee. This was a retrospective analytical study conducted on all blood units donated within a period of two years from May 2022 to April 2024 and all blood component transfusions done during this period.

Data was collected from Blood Centre records regarding blood donations, Blood requisitions and transfusion and Adverse transfusion reactions.

NABH QIs are calculated using the formulae given by NABH. The formulae are-

1. Percentage of Transfusion Transmitted Infections (TTI%) =

$$\frac{\text{Combined TTI cases (HIV+, HBV+ HCV +Syphilis + MP) in whole blood donations/collections}}{\text{Total no. of whole blood donations/collection}} \times 100$$

2. Percentage of Adverse Transfusion Reactions =

$$\frac{\text{No. of adverse transfusion reactions}}{\text{Total number of blood/ component units transfused}} \times 100$$

3. Wastage rate % (excluding discards due to TTI reactivity) =

$$\frac{\text{No. of blood/blood components discarded}}{\text{Total no of blood/blood components prepared}} \times 100$$

4. Turnaround Time (TAT) of Blood Issues=

$$\frac{\text{Sum of the time taken for crossmatch}}{\text{Total number of blood and blood components crossmatched}}$$

STATISTICAL ANALYSIS

The data was entered in Microsoft excel and the sum and averages were calculated. The quality indicators were calculated using the the formulae given by NABH.

RESULTS

A total of 7764 donors were screened during the entire study period. Out of 7764, 7607 were accepted

for the donation and 157 were deferred. All the accepted donors were voluntary and maximum donations were done in outdoor blood donation drives. The blood donor selection criteria as guided by the drug and cosmetics act- GSR 166e were applied for the whole blood donor selection (3). The common reasons for deferral were low Hb, Donors on certain medications e.g., antiotics, tooth extraction etc.

The total number of components prepared was 16714 during the entire study period.

The overall TTI % during the entire study period was 0.64. The total number of units discarded due to TTI reactivity was 127. The infection wise units discarded were as follows (Table1)-

Table 1: Transfusion Transmitted Infection percent (TTI %) in the study period

Transfusion transmitted Infection	No of units discarded	%
HIV	40	0.52
HBsAg	66	0.86
HCV	21	0.27
Malaria	0	0
Syphilis	0	0

The wastage rate of components because of reasons other than TTI Reactivity was 1.94%. The total number of units discarded was 325 during the entire study period. The component wise no of units discarded were as follows (Table2)-

Table 2: Wastage rate (WR) of blood components in the study period

Component	No of units discarded	%
PRBC	16	4.9
FFP	92	28.3
RDP	217	66.7

The total number of adverse transfusion reactions were 20 during the entire study period. Out of 20, 13 were allergic transfusion reactions and 7 were febrile non hemolytic transfusion reactions (FNHTR) (Table3). No hemolytic transfusion reaction was reported during the study period. The ATRR was 0.12%.

Table 3: Adverse transfusion reaction rate (ATRR) in the study period

Nature of reaction	No of events
Allergic transfusion reaction	13
febrile non hemolytic transfusion reaction	7
Total	20

The mean TAT for the routine issues was 31.5 min and that for emergency supplies was 14.3 min in our study. TAT for routine supplies was analysed for 7261 PRBC units and that for emergency supplies was analysed for 219 PRBC units.

DISCUSSION

In the recent past, the quest for safe blood supply has led to tremendous growth in the content and scope of the science and practice of Transfusion Medicine (1). The safety and clinical benefit of the blood component transfusion is directly dependent on the quality of blood transfusion services. Demand from the stakeholders of the concrete proof that the expected degrees of the quality have been met or preferably exceeded, has led to the evolution of quality indicators (1). These quality indicators are the tools of quality management system.

Our Blood Centre is monitored by National Accreditation Board for Hospitals and Healthcare Providers as a part of Hospital NABH accreditation. The accreditation programme by NABH strives

to maintain the quality and safety of collecting, processing, testing and transfusing of blood and blood components (2). According to NABH, some key performance indicators (KPI) have been mentioned as mandatory for the monitoring of blood and blood components transfusion, which are:

1. Adverse Transfusion Reaction Rate (ATRR)
2. Turnaround Time (TAT) of Blood Issues

Along with that, we are also monitoring Blood Centre QIs such as

1. Transfusion Transmitted Infections Percent (TTI%)
2. Wastage rate (WR) percent (excluding discards due to TTI reactivity)

In this study, we analysed the QI data of our blood centre. Thereby, we tried to evaluate the problems with a goal to improve to meet the NABH benchmark and to exceed the benchmarks wherever possible. The mean TTI % in our study was 0.64%. This was similar to that in studies by bhandari et al (4), Hariharan et al (5) and Fernandes et al (6). It was little higher in the studies done by Zulfikar et al - 0.82% (7) and Varshney et al-o.93% (8). In a studv by Gnanaraj et al, it was 3.39 % (9). Our benchmark for TTI % is 2%. Among the tested TTI infections in our blood centre, the prevalence of HBsAg was highest (0.86%) followed by HIV (0.52%) followed by hcv (0.27%). The prevalence of HIV in our donor population corresponds with the seroprevalence of HIV in general population of marathwada region of Maharashra, India i.e., 0.72% (10). The prevalence of HBsAg and of HCV meet the benchmark. Organizing regular blood donation motivation and awareness sessions for the general population, stringent blood donor screening and selection criteria and training of the doctors and staff for donor screening, pre-donation and post-donation counseling and 100% voluntary blood donation have helped us meet the benchmark for this important quality indicator.

The mean wastage rate in our study was 1.94%. This is similar to that in study by Gnanaraj et al- 2.11% (9). This calculation was excluding the no of units discarded due to TTI positivity. Other Studies Viz. Bhandari et al (4), Kaur et al (11) noted the wastage rates to be around 2.27% which also included the no of units discarded due to TTI reactivity. The component wise wastage rate was 4.9% for PRBC, 28.3% for FFP and 66.7% for platelets. The high wastage rate for platelets accounts to the short shelf life of 5 days and to some extent to the reluctant attitude of clinicians for across the group platelet transfusions. We had organised special session on platelet transfusion therapy and discussed about the safety of across the group platelet transfusions with clinicians. Many clinicians are now accepting across the group platelet transfusions after the CME. Careful positioning, procurement from deep freeze and careful thawing of FFP is being done to avoid leakage and breakage. Excess FFPs are sent for fractionation. For all the components, we are strictly implementing the First in First Out policy to avoid wastage due to expiry. We are also educating the clinical and nursing staff about the disruption of cold chain caused by storage of blood components outside blood centre at inappropriate temperature. This happens because components are requested to be issued from blood centre much more time before the surgery starts or the actual transfusion is initiated in wards or ICUs. This leads to wastage of blood components as they cannot be transfused due to disruption of cold chain.

The mean Adverse transfusion reaction rate in our study was 0.12% which was equal to that in study by Gnanaraj et al (9). This was similar to that noted by Bhattacharya et al-0.18% (12) Chakravarty-Vartak et al-0.16% (13), and Hariharan et al-0.14%(5). Bhandari et al noted it to be 0.25% which is slightly on higher side of the present study (4). Allergic transfusion reactions were predominantly reported followed by FNHTR. Use of leucofiltered blood components is advocated to reduce incidence of febrile transfusion reactions especially in patients with history of such reaction. No hemolytic transfusion reaction was reported during the entire study period. Repeated training of technical staff in crossmatching procedures and installation of Blood Centre software as well as training of clinical and nursing staff for bedside transfusion practices has resulted in complete prevention of ABO incompatible transfusions and the hemolytic transfusion reaction. We have also enrolled our blood centre under Hemovigilance Programme of India (HvPI). As per Jain et al, a well-functioning hemovigilance system could be used as quality indicator for monitoring the blood transfusion safety and also contribute significantly to evidence-based transfusion medicine (14).

The mean TAT for the routine issues was 31.5 min and that for emergency supplies was 14.3 min in our study. The emergency TAT reported by Gnanaraj et al was 18.3 min (9), Mitali et al was 28.83 min (15), varshney et al was 29.8 min (8), Mukherjee et al was 28.5 min (16) and Bhandari et al was

32.4min (4). Routine TAT reported by Varshney et al was 135.8 min (8), Mukherjee et al was 141.3 min (16) and Bhandari et al was 148.6 min (4). Our benchmark for routine supplies is 30 min when we are doing crossmatch using column agglutination technology and that for emergency supplies is 15 min. Training of our technical staff to handle the emergency requests has made us achieve the benchmark for emergency supplies. But we could not meet the benchmark for routine supplies and we did the root cause analysis for that. Inadequate staff availability specially on days when we have more than one outdoor blood donation camp is the most frequent cause. We have recruited two more technical staff to address this issue.

We are regularly conducting Hospital Transfusion Committee meetings wherein the KPIs are reviewed and discussed. The problems are identified, root cause analysis is done and corrective and preventive action plans are formulated.

CONCLUSION

The analysis of these QIs has helped us identify the areas in which our services are satisfactory and the areas where we need to improve. In areas where our services are satisfactory, we are trying to reinforce the practices that translate into quality and striving more to refine the processes to exceed the benchmark. In areas where we need to improve, we are trying to address the challenges associated with the QIs by continuous monitoring, process improvement and adoption of innovative technologies. We plan a further 5 year audit of these QIs in near future to see the trend of QIs. Such analysis and continuous refinement of practices will help ensure the ongoing success of blood transfusion practices and improving quality of patient care.

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