Turnaround Time For Issuing Blood Products in Emergency-A Prospective Real Time Study in a Regional Blood Transfusion Centre

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ABSTRACT

Introduction: Turnaround time (TAT) is one of the key performance indicator of laboratory services. In transfusion services it is more important due to involvement of emergency cases often. We analyzed the TAT in issuing blood units using Immediate Spin Crossmatch (ISCM) in our institution and also tried to identify the factors which leads to increased TAT which can be rectified for a better performance.

Material and Methods:125 cases requesting ISCM over a period of one month were observed by a team of investigators used standardized electronic timers and Turnaround Time was noted. Standard TAT was fixed as 30 minutes. Reasons for increased TAT were determined by Root Cause analysis.

Results: Emergency requests were commonly sent from surgical departments (64%) and majority were finished in a TAT of 11-35 minutes. However, a good number of cases (47.2%) extended beyond standard TAT. Main causes for delay was improper filling of request, inadequate sample labeling, manpower shortage and request for multiple blood products simultaneously.

Conclusion: In spite of the continual emphasis on quality control and customer satisfaction, it is a challenge to maintain Turnaround Time within acceptable limits even in emergencies. On physician side, training and mechanisms for prompt detection of errors in filling up requests and sample processing is essential. On lab side better work force management and well defined and well-practiced SOPs for sample identification, attending enquiries, managing multiple requests etc. may help in future.

Keywords: Turnaround time, immediate spin crossmatch, quality indicator, root cause analysis, blood transfusion

INTRODUCTION

The efficiency of clinical workflows in healthcare sector have come under constant surveillance recently. Awareness quotient regarding customer rights are significantly higher than past decades. Along with accuracy and precision, laboratories are bound to maintain timeliness also while delivering services. Hence turnaround time (TAT) is considered as one of the most noticeable signs and key performance indicator of laboratory services.[1-3]

Since the nature of patients served in transfusion medicine differs from routine laboratory services, service quality and analytical quality should be concurrently sought and are equally important here. From a clinician's view point, delivering the required blood units on time might be the most important performance indicator of blood bank. For emergency cases, delay of even few minutes in availing blood can make a whole difference. It is well implied that monitoring and improvement of TAT is highly recommended and beneficial for transfusion services. Moreover, routine monitoring of quality indicators including TAT in transfusion medicine improves patient safety and customer satisfaction.[4,5]

The first step for reducing TAT toward a desired goal should be finding out the variation of TAT for different services, products and schedules. It also needs identifying the causes of delay in TAT and taking corrective measures to eliminate them. Those causes with greatest effect should be addressed first, considering the constraints of time, manpower and resources to handle all issues at once.

Our institution is a Government medical college with a huge work load for transfusion services with around 80,000 blood products issued annually. Although there are various steps from collection of blood to issue, whose TAT should be analysed, the most crucial is the time taken from a request being placed for transfusion and issue of the compatible blood unit for the patient. Hence we analyzed the TAT in issuing blood units using Immediate Spin Crossmatch (ISCM). We also tried to identify the factors which leads to increased TAT in our Centre in issuing blood and blood components. Our aim was to establish an appropriate benchmark for TAT with regular monitoring, which is also important for customer satisfaction and quality management.

MATERIAL AND METHODS

This was a prospective study conducted in Department of Transfusion Medicine, Government Medical College, Trivandrum for the period of one month (1-07-2014 to 31/7/2014). TAT was defined from time of reception of an issue request to time at which the blood unit was handed over to attender for transporting it to bedside.

All emergency requests for Packed Red Cells (PRC), fresh frozen plasma (FFP) and platelet concentrates (PC) during this period were included. Cases excluded were for those who needed Antihuman globulin (AHG) crossmatch, elective cases, crossmatched for reservation and units that required additional special handling (e.g., washing, irradiation).

The process of issuing blood was analyzed and found to be various phases.

1. Reception of issue request and sample and allocation to a technician for crossmatching which is entered in the allotment register with date and time
2. Transporting the sample to testing site
3. Selection of blood unit and compatibility testing

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4. Labelling and Transport to issue counter
5. Reception by attender who signs the receipt with date and time.

Start and stop times were recorded by the study team (1 in sample reception,1 in blood allotment room,1 in cross match room, 1 in Issue counter) with the help of timer. Standard turnaround time was fixed as 30 minutes for blood units issuing after immediate spin cross match from previous literature. Data collection was done in real-time in prepared worksheet. The nature and execution of the study was not revealed to staff involved in sample processing and compatibility testing to avoid bias in results. Synchronized electronic timers were employed to ensure integrity of the recorded times.

Data was recorded during all shifts in a day (Forenoon shift:8am-1pm, Afternoon shift:1pm-6pm and Night shift:6pm-8am). Reasons for delay are noted in cases of prolonged TAT. Type of product and the number of product needed was recorded from the request. Date regarding associated factors were collected as per proforma by real time observation of investigating team.

STATISTICAL ANALYSIS

Data was entered in excel sheets daily. Analysis was done in SPSS version 16. Data of continuous variables are reported as the mean (95% confidence interval [CI]). Mean values were compared by independent t test and Analysis of Variance. Significance was accepted at probability values of 0.05 or less.

RESULTS

125 cases which were issued after ISCM during the study period of one month were analyzed. Majority (64%) of cases belonged to surgical specialties which includes surgery, obstetrics and gynecology (OandG), orthopedics, cardiovascular thoracic surgery (CVTS), pediatric surgery, neurosurgery. Various other non-surgical specialties (36%) which needed blood on emergency includes medicine, nephrology, hematology, medical gastroenterology etc.

Figure-1 shows distribution of cases according to the time taken for issue and it showed a wide distribution of cases according to TAT. 78 (62.4%) of total cases falls between 11 to 35 minutes of TAT.

Among 125 cases, 59 (47.2%) cases were falls above 30 minute of TAT i.e. extended beyond standard TAT. These cases needed to be further examined to enumerate reasons for the delay.

As shown in Figure 2, mean TAT for samples during different shifts were not significantly different (ANOVA with p=0.863). TAT for issuing multiple units of blood product is more than single units as expected (Table-1). Mean TAT for single PRC units issue was 29.91 minutes and mean TAT for multiple PRC were 34.86 minutes. Also mean TAT for platelets were less compared to PRC and FFP.

Main reasons for delayed TAT as determined by root cause analysis for each case. It was noticed that some of reasons were frequently involved in increased TAT like request for multiple components for a patient processed simultaneously, issues with attender availability, blood request form not being filled properly, sample not labeled properly. Other reasons are enlisted in Table 2.

DISCUSSION

As defined by American association for blood banking, Quality indicators are specific performance measurements designed to monitor one or more processes during a defined time and are useful for evaluating service demands, production, adequacy of personnel, inventory control, and process stability.[6] Since TAT involves both physician satisfaction and quality of laboratory services it can be considered a very crucial indicator and been used since 1980s.[7,8] Among the multitude of daily administrative problems which are faced by the modern hospitals today, prolonged TAT of laboratory investigations is a crucial one, which affects patient care as well as patient satisfaction adversely.

Richard et al reported that the time needed to perform ABO and Rh typing, screening, and immediate spin cross-matching and to then issue red blood cells (RBCs) for transfusion is 30 to 90 minutes depending on the systems used.[9] In an another study by Bruce et al noticed that median turnaround times of 30 minutes for RBC units to be issued and 35 minutes for delivery of RBC units to the operating room following an emergency request to the blood bank are reported by many authors including Q – Probe College of American Pathologists.[10] Various other studies have described a TAT of 30 minutes as acceptable after the clot arrives in blood bank.[11] Considering these facts we set a limit of 30 minutes as appropriate in our study. TATs which extended beyond this limit was analyzed to find out the possible causes.

While comparing TATs across institutions technologies used

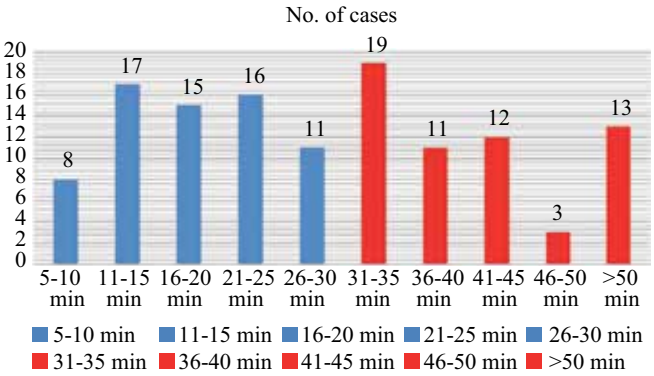

Figure-1: Distribution of cases according to the TAT taken for issue.

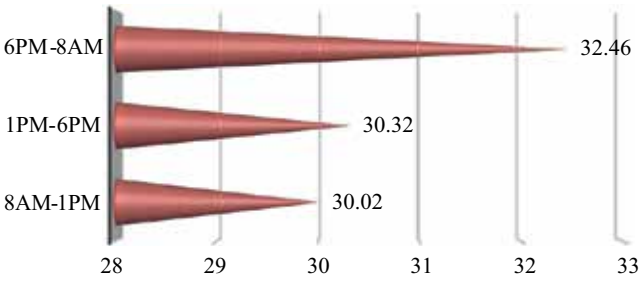

Figure-2: TAT according to time of day

Components	No. of cases	Mean of TAT	SD
PRC (single)	32	29.91	7.099
PRC (multiple)	07	34.86	11.860
FFP (multiple)	20	35.25	7.879
PC (multiple)	06	26.67	8.165
Multiple Components	19	36.37	8.960

Table-1: Distribution of Turnaround Time According to number of components

TAT	No. of cases	Reason for delay
31-35 min	19	1. Multiple blood request simultaneously 2. Hospital Attender shortage 3. Technician attending phone calls 4. Request not filled properly 5. Sample not labelled 6. IP number doesn't tally
36-40 min	11	1. Thawing (FFP) 2. Multiple blood request simultaneously 3. Bystander not available 4. Hospital Attender shortage
41-45 min	12	1. Request not found 2. Sample not labelled 3. Lysed sample 4. Leaking of units 5. Thawing (FFP) 6. Technician shortage
45-50 min	2	1. Sample inadequate 2. Instrument breakdown 3. Compatible unit not found
≥ 50 min	14	1. Sample not found in the storage area 2. Discrepancy 3. Damaged unit 4. Bystander not available 5. Lysed sample 6. Sample not labelled properly 7. Power supply interruption 8. Searching for units 9. Multiple blood requests

Table-2: Reasons for increased TAT in issuing blood on emergency

for sample processing and compatibility testing should be considered. Also the type and screen policy and steps of compatibility testing differs across centers. Studies which do not include multiple product issues report lower TAT. Colt M. McClain et al, compared the mean TATs at the two institutions for orders of RBCs. They found that mean TAT for emergency blood issue were 10 ± 3.8 min in one Centre and 14 ± 7.2 min in another. But they included cases eligible for analysis had completed type-and-screen results with requests for four or fewer RBC units. Patients with a positive antibody screen had serologically crossmatched units prepared and reserved for intraoperative use in advance resulting in emergency TAT of 10 to 15 minutes.[5]

Study by Weiskopf et al described TAT for a procedure which involved previously crossmatched blood units which needed only issue to operating room.[9] 82% of units issued reached the operating room within 2 minutes of request, 91% arrived within 3 minutes, and 100% arrived within 4 minutes. Other authors also have reported very short TATs when only issuing was involved and compatibility was checked beforehand.[12,13]

As expected emergency requests were placed more from the surgical side especially from the subspecialties of surgery and orthopedics. Need for major compatibility test automatically prolongs the TAT of RBC units. Likewise Thawing contributes to the TAT of fresh frozen plasma.

Root cause analysis demonstrated four causes mainly but we could not determine the proportionate contribution of these main causes to the overall delay.

1. Issues with improper filling of Blood issue requests and improper labeling of samples.
2. A number of blood/components demanded simultaneously resulting in panicking
3. Technicial Staff not available in adequate numbers
4. Sample or Request Misplaced

Important reasons for increased TAT observed by similar studies are simultaneous massive transfusion protocol in progress, issue delayed by phone calls, multiple orders received simultaneously, orders of units to be released over extended period of time etc.[11,14] In an Indian study by Kalyan Khan, various staff problems related to manpower management and staff preferences were found to be an important contributing factor for delayed TAT.[15]

Stotler et al performed an interventional study with a hypothesis that the delays occurred because of a disproportion between the patient sample workload and the number of employees available in the stat preanalytic area to handle this workload. They demonstrated that the addition of 2 clerical staff would significantly improve TAT in our stat area during day shifts on weekdays.[16]

A reason for increased TAT in our setting can also be lack of automated facilities for sample transport and manual documentation. This issue is identified by similar studies in huge centers with high work load yet to avail fully automated facilities.[17,18] Automation is reported to have significantly decreased TAT also.[19] A wide variation of TATs were also observed by some authors.[20]

Limitations of the study may include that although recording the event times, arrangements were made to keep the staff unaware of the objectives, some knowledge about being observed may have escaped. However, study helped us to assess the efficiency of our work flow and services in the current scenario. We have chosen the simple method of analysis of TAT as actual mean values rather than a time to event analysis.[3]

CONCLUSION

We observed a wide variation in Turn Around Time in Emergency cases and many cases which extended beyond the standard TAT. By finding out the root causes in a case by case analysis, we can develop strategies to narrow the TAT to standard minimum. Education to clinical staff by demonstration regarding requesting blood units and sample labeling, strict adherence to SOPs, improving work force distribution, Re-assigning the duties to manage multiple request and massive transfusion protocol may be under primary consideration. This study serves as a starting point for establishing a benchmark for TAT in issuing blood units in our blood bank. All the reasons we got from our study were evaluated and it will be rectified in future to decrease TAT.

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