



RESEARCH ARTICLE

PREPARATION FOR THE IMPLEMENTATION OF BLOOD STOCK MANAGEMENT FOCUSED ON TIME EXPIRY WASTAGE IN SOLAPUR DISTRICT OF INDIA; A RETROSPECTIVE CROSS SECTIONAL STUDY

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ABSTRACT

Aims: Wastage of blood due to 'time expiry' and surplus blood stock management.

Design: Retrospective and cross sectional study of 12 years of district Solapur.

Analysis: Average blood wastage % due to 'time expiry' wastage of blood for each block of 4 years and overall average of 'time expiry' wastage %. Results are plotted on area graph from year 2003 to 2014.

Results: 'Time expiry' of blood discard% is increased from 1.27 % to 4.64 % i.e. 3.65 fold. Average of 12 years' time expiry % is 2.65%. The government of India scheme of 'bulk transfer' is to be implemented to reduce further 'time expiry wastage'.

Conclusions: Inventory control on 'time expiry' wastage is by 'bulk transfer' of blood.

INTRODUCTION

Surgical procedures could not be carried out without the use of the blood and there is no substitute for the human blood, so, the blood is a precious and utilized judiciously with minimal wasting. (Kumar *et al.*, 2014) In India surplus of blood is being wasted in some blood banks at the same time the scarcity of the blood is reported in other parts of the country. This was initially considered by group experts of NACO, and has been approved in its meeting on 05/08/2015, later on the health ministry granted an approval to a new initiative of a 'bulk transfer'. (Bulk transfer.pdf)

MATERIALS AND METHODS

This blood bank is owned by the state Government of Maharashtra. The regulatory authorities are FDA, NBTC, SBTC (a state branch of NBTC and its headquarter is at Mumbai), NACO, MSACS (a state branch of NACO and its head quarter is also at Mumbai), and national headquarters of NBTC and NACO are at New Delhi. This nodal blood bank collects the reports from all blood banks of the Solapur district and submits after compilation of data to these mentioned regulatory authorities. So this data is being analyzed in respect to 'time expired' blood wastage for 12 years since year 2003'.

RESULTS

According to WHO report only 9 million units are collected annually, while the need is for 12 million units, despite being a country with a population of 1.2 billion, India faces a blood shortage of 3 million units, and the problem can be addressed if an additional 2% of Indians donated the blood.

Table 1& Fig 1 shows the 'time expiry' of blood discard% is increased from 1.27 % to 4.64 % i.e. 3.65 fold. First 4 years average was 2.36 % nearly equal to 12 years average, next 4 years average was reduced to nearly half i.e. 1.24%, then in last 4 years it had been spurt to 4.35% i.e. 3.5 fold of last four years average, so this rise in 'time expiry discard %' has compelled for this present research analysis.

Non TTD discard reasons of wastage of blood and blood components are 1) Time expiry 2) Clot 3) Wasted import 4) Leakage 5) Medically ordered not used 6) No need for patient 7) Without cord 8) Miscellaneous. (Far *et al.*, 2014).

Out of above mentioned reasons the time expiry reason is building the major portion of blood wastage, which may be controlled by proper planning of utilization. But wastage due to non TTD causes of the discard of the blood bags which is due to expiry which is not decreasing but increasing.

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Table 1. Overall average of 12 years is time expiry % is 2.65

Serial Number	Year	Time expiry %	Discard %
A	B	C	D
1	2003	1.27	
2	2004	2.84	
3	2005	2.22	
4	2006	3.11	2.36
5	2007	1.18	
6	2008	1.16	
7	2009	1.44	
8	2010	1.16	1.24
9	2011	3.80	
10	2012	3.19	
11	2013	5.78	
12	2014	4.64	4.35

Fig. 1. Area graph showing year wise time expiry % in the district Solapur

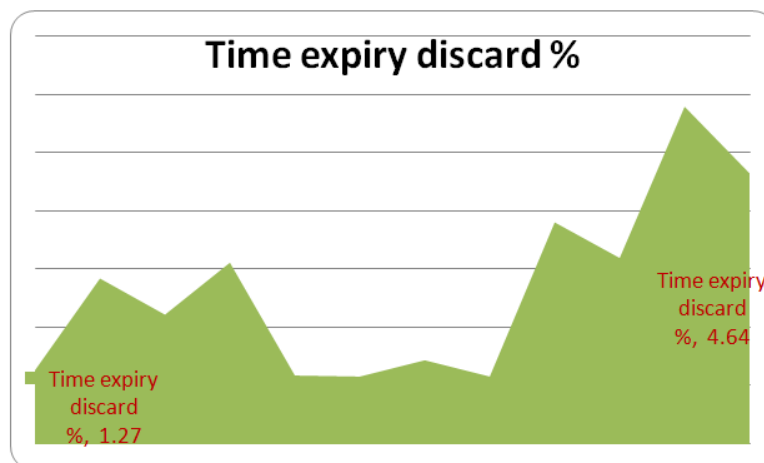


Table 2. Comparison of studies regarding time expiry of blood

S.No.	Study	Period Years & Month	Extent of study	Time Expiry %	Major Recommendations
1	Mohebbi <i>et al.</i> (2014)	1 Yr.	Prospective study monitoring Qazvin Province (Iran)	14.03	Monitoring consumers for the supply of products and Hemovigilance.
2	Kumar <i>et al.</i> (2014)	1 Yr. 7 M	Prospective study, blood bank of tertiary center.	04.85	Properly implemented blood transfusion policies will also help in discarding the less number of blood bags due to expiry.
3	Singhal <i>et al.</i> (2013)	2 Yrs	Retrospective Study, blood bank of tertiary center.	05.39	Hospitals should be attached to blood bank, a proper inventory management system with accurate and timely data formation is necessary to minimize wastage.
4	Present study	12 Yrs	Entire District of Solapur India.	02.65 (Over All Average)	Sharing stock can reduce time expiry wastage in blood supply chain. (Reduction of time expiry wastage in the blood supply chain by sharing stock, 2009)

DISCUSSION

Friedrich-Alexander University analysis indicated a significant relationship between hospital size demand variability and time expired wastage. Larger hospitals exhibit lower level of

demand variability and low level of time expired wastage. Small hospitals exhibit high level of demand variability and have high level of time expiry wastage. Redistributing their red cell stock to larger hospital, the small hospitals can reduce their time expiry wastage.

Following are the barriers to stock sharing

1. Cold chain validation.
2. Set up cost.
3. Financial arrangements.
4. IT system /documentation

Benefits of stock sharing are

1. Reduced time expiry wastage-red cells close to expiry are more likely to be transfused if they are moved to another larger hospital as there is highly significant relatively between hospital size and time expiry of red cells.
2. Trust between hospitals: seen as precursor for further collaboration.
3. Stock management flexibility: red cells of minor groups could be stocked by smaller hospitals without increasing time expiry losses.

Success factors are

1. Mutual and fair benefits for all participants.
2. Financial compensation for shared units.
3. Cold chain validation.
4. Trust between hospitals.
5. Availability of transport between hospitals.
6. Service level agreement. (Reduction of time expiry wastage in the blood supply chain by sharing stock. 2009)

Reasons for wastage of blood

- i. Packed RBC: Major reason was expiry followed by reason of HbsAg reactive and high bilirubin content.
- ii. FFP: Major reason was breakage followed by high lipid content, RBC Contamination, HbsAg reactive and high bilirubin.
- iii. PC: Major reason of platelet concentrates was due to expiry 82.01%, followed by HbsAg, high bilirubin and high lipid content.
- iv. Whole Blood: Major reasons were QNS, Expiry, HbsAg and HCV positive. (Singhal *et al.*, 2013)

In Iran 4 main processes are implemented.

- 1) Blood, and blood components requisition by physicians form organization of blood transfusion.
- 2) These products are stored in blood banks of hospitals, compatibility tests are done before transfusion.
- 3) Transfusion process itself and
- 4) Monitoring of side effects.

Redistribution of blood between hospitals could lead to a reduction in time expired wastage, time expiry of red cells accounts for 69% of packed red cell.(Far *et al.*, 2014)In view of blood wastage observed, since 2012 NACO of India restricted the number of units in a single voluntary blood donation camp i.e.500/day. Quazan (Iran) study also shows packed RBC % of wastage due to time expiry is more i.e. 46.7%, also this study indicates % of wastage due to time

expiry is maximum in teaching hospitals as compared to private hospitals, social welfare hospitals ,charity hospitals and multi-specialty hospitals. Results of investigating the common of blood and components wastage were associated which includes expiration of usability period; it is also found 58.3% were also wasted in teaching hospitals. (Far *et al.*, 2014)Overall discard rate only due to expiry is 4.85 % in central India study. Properly implemented blood transfusion policies will also help in discarding less number of blood bags due to expiry. These discarded blood bags because they are unutilized are both financially as well as socially harmful to the blood bank (Kumar *et al.*, 2014). Blood and blood components are important resources hence should be used in justifiable manner .Minimizing wastage by case of reallocation of reserved but unutilized blood to blood banks attached to hospital. A proper inventory management system and timely data base formation is necessary to minimize wastage. Most common cause of discarding blood components was expiry of date due to non-utilization. Major reasons of wastage (discard) of pRBC & PC was expiry, the maximum number of PC units is discarded due to expiry (82.01%) due to short expiry Period. The existing practice of replacement if possible is to be continued. (Singhal *et al.*, 2013) However the comparison of 3 studies with present study shows the somewhat better results having overall average of 12 years' time expiry percentage is 2.65% which is lowest one, the government of India scheme which is at par with NHS Blood Stock Management Scheme of UK, it has to be implemented, then further optimization of results can be observed in future.

Conclusions

Government of India's action recently taken can lead to increase in the efficiency of blood transfusion service in the country by permitting the bulk transfer of blood between licensed blood banks under following 13 conditions

1. Transfer shall be allowed between licensed blood banks in any set up. (Public/NGO/ Private).
2. Transfer of blood and components in bulk shall be permitted across the state borders to also ensure the availability at the point of need.
3. Also transfer shall be done at recommended temperature and as per storage conditions for whole blood and components. The supplier blood bank shall be responsible for compliance thereof.
4. The recipient blood bank should have capacity to hold the units requested for at appropriate temperature till the time of utilization.
5. Broad based donor consent should be incorporated in the standard donor form to ensure that the donor agrees to his blood unit being utilized beyond the blood bank where it is donated.
6. The supplier blood bank can levy the prescribed processing charges on the patient/recipient /recipient blood bank as per NBTC norms.
7. However the recipient blood bank can levy only processing charging for compatibility testing, in addition to charges levied by supplier. Blood bank from the patient/recipients from such transferred units.

8. Records of traceability shall be retained throughout process.
9. Supplier blood bank shall be responsible for all complications except for those related to compatibility testing will be responsibility of recipient blood bank. Recipient blood bank shall report and evaluate all adverse transfusion reactions including those happening due to blood that has been transferred from the supplier blood bank.
10. Documents accompanying transfer shall include TTI testing report and record of transport in appropriate temperature.
11. All blood banks are considered deemed approved to act as functional storage centers for blood and blood components even though the upper limit of 2000 units utilization per annum is not applicable.
12. All blood banks and storage units be instructed to issue blood to all patients needing transfusion and not restricting blood issue to captive requirement of institutions to which they are attached.
13. Blood banks would be informing regarding bulk transfer to SBTC and in case of interstate bulk transfer to NBTC. Formats for request and issue of bulk transfer of blood are framed for uniformity of record.(Bulk transfer.pdf)

of blood stock management specifically time expiry wastage in the blood supply chain by bulk transfer of blood, hence surplus blood stocks management can be successfully achieved.

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Bulk transfer.pdf.

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The rate of wastage of blood and blood components in the district Solapur, India, the overall average of 12 years (2003 to 2014) is 2.65%, which can be diminished by implementation
