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Utilization of red cell concentrate from storage centers of South Gujarat

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Abstract:

INTRODUCTION: Blood storage centres in remote areas of the country was started to serve the patients in those locations. Present study analyses the the utilisation of blood from such storage centres under one regional transfusion centre in south Gujrat.

MATERIALS AND METHODS: In this retrospective study amount of blood requested, utilised, major reasons for utilisation were studied from available records and analysed.

RESULTS: 20 storage centres serving almost 2 million population per year was studied. 2197 - 3089 units of blood were requested from these centres per year with utilisation rates of 100 – 134 units/centre/year. Severe anaemia, Antenatalcare, operations and postpartum. Haemorrhage were important causes for red cell transfusion.

DISCUSSION AND CONCLUSION: The storage centres are functioning reasonably well but utilisation of around 2500 - 3500 units packed red cell per year for 2 million population suggests under utilisation of the facility.

Keywords:

Post partum haemorrhage, storage centres, utilisation

Blood saves lives, and the major cause of maternal mortality in India as well as in the many parts of the developing world is hemorrhage.^[1,2] Severe and moderately severe anemia due to nutritional factor, hemoglobinopathies, and repeated infection as well as helminthisis compound this problem,^[3] which also compromises the lives of nonpregnant populations in more than half a million villages and tribal areas in rural India.

One of the ways devised by the Government of India to make blood for transfusion available in those remote areas of the country was through provision of storage centers.^[4]

This retrospective analysis of the utilization of red cell concentrates by twenty blood

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storage centers under a regional blood transfusion center in tribal-dominated South Gujarat was done. The record of the number of units provided to each storage center during 5 years was evaluated by two authors (YP and KJ), and the record of its utilization over the last 1 year was analyzed as the data beyond that were not properly kept. The geographical location and population served by the health facility where storage centers were located were obtained from data available from state health archives.

Details of the storage centers, number of population served by the health-care facility where the storage centers were located, and the range of number of red cell units utilized by each of the centers are presented in Table 1a. The most striking feature of the data was a huge year-to-year variation of blood utilization rate in different storage centers as well as in individual storage centers, with the lowest being at

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CHCM with 1–5 units/year and the highest at SRHJ with 384–870 units/year [Table 1]. There was no report of

Table 1a: Number of storage center, population served, and number of blood units utilized per year

Storage centers	Population served	Blood units used
SKH	18,368	38-241
GHR	34,845	308-586
CHCJ	43,344	10-138
CHCM	51,376	1-5
CHCS	110,924	18-59
SRHJ	5446	384-870
CHCB	60,821	210-333
CHCS _o	229,782	29-163
CHCV	50,789	73-190
CHCZ	394,440	23-60
CHCV _a	16,075	16-66
SDAMH within Surat city (60 lakh/served by 487 hospitals)		29-556
CHCM _h	452,011	26-47
CHCV _{al}	7678	32-49
CHCV _{ag}	7724	46-104
CHCO	196,846	54-66
CHCU	3172	3-5
CHCU _c	86,205	20-32
CHCD	9026	24-25
SHA	140,839	40-46
Total	1,919,711	

Table 1b: Number of centers utilizing blood at different intensities

No. Units/year	No of Centres
>300 units/year	Four centers
100-300 units/year	Five centers
25-100 units/year	Nine centers
<25 units/year	Two centers

Table 1c: Reasons for transfusion over the last 1 year (percentage of total blood units used)

Indications	% of total Units	No. Cases
Moderate-to-severe anemia	33.2%	532 cases
Antenatal care	31.6%	371 cases
Cesarean section	14.6%	64 cases
Postpartum	13.6%	17 cases
Other cause of bleeding	7.0%	10 cases

serious transfusion reaction from any of the centers. Table 1b shows the number of storage centers classified on the volume of blood utilization/year, i.e., 4 centers used > 300 units/year, whereas 2 centers used < 25 units/year. Table 1c shows the top five reasons for red cell transfusion over 1-year period in all the twenty storage center facilities together, and Table 1d shows year-wise blood utilization rates, return of units to mother facilities, and the average number of units used for the twenty centers. It can be easily seen that yearly utilization of blood varied from 2097 to 3089 units and return rates were 3.6%–7.05%. On an average, 129 units were used for a center over a year.

The utilization of blood units from each of the storage centers was extremely variable, and this predicated any inventory plan by the mother blood center. Fortunately, none of the average 2574 units sent to these storage centers every year were discarded because every 10–15 days' interval of supply and return of blood to the storage centers ensured that any center left with units having <10 days to expiry were returned to the mother center to be replaced by fresh red cell concentrates.

A balance of ABO- and Rh D-positive and ABO- and Rh D-negative blood units was supplied. This method ensured a return rate of 3%–7% of blood units without any wastage. Major utilization of blood was for the treatment of severe anemia (hemoglobin < 7 g/dL). This is a cause for concern as it suggested that management of anemia by standard medical management was not reaching the community properly, considering the fact that this was a tribal belt and also has sickle cell gene as one of the major hemoglobinopathies in addition to other causes of anemia. Higher utilization of blood units for the treatment of anemia may not be unexpected. Other important reasons for which blood transfusion was used were antenatal care, cesarean section, and postpartum hemorrhage.

Hence, it may be concluded that storage centers were providing red cells for one of the major reasons, i.e., curbing maternal mortality, for which it was primarily set up.^[4]

There is a paucity of data as to how well the storage centers were utilized for blood for the patient in need

Table 1d: Year-wise utilization rate of blood units of all storage centers taken together

Year	Units requested	Use of unit	Returned units (%)	Range of blood units
2014	2403	120/centers/year	147 (6.1)	98-870
2015	2197	100/centers/year	80 (3.6)	10-868
2016	2495	125/centers/year	176 (7.05)	29-680
2017	3089	134/centers/year	128 (4.1)	5-643
2018 (projected till date)	2684	134/centers/year	132 (4.9)	89-684
Mean range	2574 (2197-3089)	129 (110-154)	132.6 (80-176)	5-870

in the remote areas of the country after they were set up almost 15 years back.

However, our data showed that blood units sent to these storage centers are well utilized, and frequent supply of these units on the basis of requirement regular communication ensured that huge variation in demands could be accommodated and served. The area served by these storage centers serves a population of 1.9+ million and from that standpoint, use of around 2500 units of red cells seems to be less and probably these storage centers should do more rather than underserving the population.

Storage centers alone cannot sort out this deficiency because it is the doctors from different specialties, particularly those who are working in community health centers (CHCs), request blood for patients. As many CHCs are understaffed, poor utilization of blood can be easily understood for the lack of expert workforce who could use the blood and blood products more efficiently.^[5]

Moreover, with improvement of roads and ambulance services, many of the remotest areas around Surat are capable of bringing their patients to better facilities in Surat. This could also be one of the reasons why storage centers are not using good amount of red cells in proportion to the population it served.

The National Aids Control Organisation (NACO's) original suggestion was that each storage center should stock 5 units each of AB- and O Rh D-positive red cells, 2 units of AB RhD-positive, and 1 unit each of A-, B-, and O- negative red cells.

However, in reality, none of the twenty storage centers did hold that kind of stock all the time. Again, one of the reasons could be that any of the centers can be reached from the mother blood bank within 2–3 h.

However, the present study being a retrospective one, we could not assess how often blood was requested by the treating doctors at these remote hospitals but could not be provided because of the lack of availability of required units at the storage centers. The roads and communication system in India as well as in South Gujarat have improved immensely so that blood can now be transported from the mother center to its storage center within 2–3 h of requisition.

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Conflicts of interest
There are no conflicts of interest.

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