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## ORIGINAL ARTICLES

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### Use of packed red cells in a major hospital in Harare, Zimbabwe

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**Objectives:** To document the current pattern of packed red cell (PC) usage and the crossmatch to transfusion ratio (C/T ratio) in a major city teaching hospital in Harare, Zimbabwe.

**Design:** Restropective, (audit).

**Setting:** Harare Central Hospital, a 1 200 bed multidisciplinary hospital located in Harare, Zimbabwe.

**Main Outcome Measures:** Amount of PC ordered and proportion collected for the year 1995. Quantity of PC used by different medical specialities.

**Results:** In 1995 a total of 8 292 PC were collected from Harare Hospital blood bank. This translates to an average PC usage for a 1 200 bed hospital of seven units per hospital bed per year.

Only 48.5% of PC crossmatched was collected with a C/T ratio of 2.1:1. Revenue loss of Z\$478 434 is estimated to have occurred due to expired units and resource wastage from uncollected crossmatched units. The largest consumer of PC was the Department of Gynaecology, followed by Surgery and Paediatrics.

**Conclusion:** Regular auditing of blood usage is recommended to promote the efficient use of PC in accordance with accepted international standards and local guidelines and practice.

#### Introduction

Blood and blood component therapy is expensive and not devoid of adverse effects, therefore appropriate use of this resource by adoption of guidelines based on acceptable standards and local experience, is important.<sup>1</sup> Improving the quality of medical care while reducing costs of invaluable resources is one of the major challenges facing modern health care systems.

According to JA Clark,<sup>2</sup> audit mechanisms for monitoring levels of blood and component wastage are not generally in place. He suggests this should be a regular responsibility of the Hospital Transfusion Committee (HTC). Each Hospital Transfusion Committee, or its equivalent, is responsible for developing its own institutional blood utilization procedures and audit criteria. Ordering should relate to the patients' clinical condition, according to clear policy guidelines.

The concept of maximum surgical blood ordering schedules (MSBOS) gives an effective guide for ordering blood for transfusion of surgical patients and is an accepted standard of practice for hospital blood banks world wide.<sup>3</sup> In Zimbabwe guidelines have been developed to assist physicians in the ordering and use of blood and blood products, which are documented in the essential drug list (EDLIZ).<sup>4</sup>

This study was designed to document the pattern of PC usage in a major referral centre in Harare, and relate this to the major consumers.

#### Materials and Methods

The study was conducted at Harare Central Hospital (HCH), a 1 200 bed hospital in Harare which caters for all disciplines. HCH procures in bulk all its blood and blood products fully typed and screened for infectious agents from the Zimbabwean

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National Blood Transfusion Service (NBTS) headquarters in Harare and stores the products in its own blood bank. Stocks are replenished regularly according to projected usage. Blood users in the hospital order their requirements from the HCH blood bank. Blood products ordered by and issued to all clinical units are recorded in a day sheet book at the blood bank. There is also a register for crossmatched units. Blood issued by the blood bank and not returned is assumed to have been used.

The numbers of PC packs ordered from and crossmatched by the HCH blood bank and the numbers issued were extracted month by month and for the whole year from the various registers. From August to October, PCs issued were classified according to requesting clinical units. Numbers of expired packs were also recorded. The value of the expired units and the cost of crossmatching unused units was estimated using current market prices.

## Results

The amounts of PC ordered from the blood bank on a monthly basis in 1995 and the amounts collected are shown in Table I. A total of 8 292 PC were collected from the blood bank. If they were all transfused that represents a PC usage for the 1 200 bed hospital of seven units per hospital bed per year. As shown in the Table II, of the PC ordered, only 48.5% were collected. This gives an average crossmatch to transfusion (C/T) ratio of 2.1:1, provided all units collected were transfused. Table I also shows the numbers and cost of expired units per month and the cost of crossmatching uncollected units, both of which represent loss of revenue to the service. The cost of crossmatching reagents and man-hours is estimated at Z\$47 per unit and rising. This results in a yearly loss of Z\$413 835 from the 8 805 units that were crossmatched and not collected.

Table I: Packed cell usage and estimated costs of processing unused and expired packs in Harare Central Hospital in 1995.

Month	Packed cells used n (%)	Packed cells unused n (%)	Cost of x-matching unused pc @47 each	Expired units	Cost of expired units @ \$353 each
Jan.	533 (54.9)	437 (45.1)	20 539	6	2 118
Feb.	605 (46.5)	695 (53.5)	32 665	5	1 765
Mar.	808 (47.3)	902 (52.7)	42 394	6	2 118
Apr.	649 (42.0)	895 (58.0)	42 065	21	7 413
May.	695 (43.4)	905 (56.6)	42 535	41	14 473
June.	649 (44.9)	795 (55.1)	37 365	8	2 824
July.	673 (48.8)	705 (51.2)	33 135	11	3 883
Aug.	729 (44.9)	893 (55.1)	41 971	18	6 354
Sept.	695 (46.6)	795 (53.4)	37 365	6	12 708
Oct.	901 (60.2)	594 (39.8)	27 918	2	706
Nov.	701 (53.9)	599 (46.1)	28 153	2	706
Dec.	654 (52.6)	590 (47.4)	27 730	27	9 531
<b>Total</b>	<b>8 292 (48.5)</b>	<b>17 097 (51.5)</b>	<b>413 835</b>	<b>183</b>	<b>64 599</b>

In addition an average of 15.3 units expired per month and at the then rate of Z\$353.00 per unit this translates to a loss of

Z\$5 383 per month or Z\$64 599 per year. By January 1999 a unit of blood cost Z\$1 169 00). Table II shows the usage of PC for different medical disciplines for the months of August, September and October. The figures were calculated as a percentage of the total PC issued by the Blood Bank. For the three months observed, the single largest consumption of PC was for gynaecological cases (26%). This was followed by surgical (22%), paediatric (15%), medical (14%) and obstetric (13%) cases.

Table II: Proportion of packed cells used by different medical units.

Medical discipline	Proportion of packed cells collected (%)							
	Aug.		Sept.		Oct.		Monthly average	
	n	%	n	%	n	%	n	%
Gynaecology	177	24.3	172	24.7	270	30.0	206	26.4
Obstetrics/ Labour ward	109	14.9	87	12.6	113	12.6	103	13.2
Paediatrics	122	16.7	91	13.1	129	14.3	114	14.8
General Surgery	81	11.1	102	14.7	124	13.8	102	13.1
Ortho- paedics	24	3.3	27	3.9	46	5.1	32	4.1
Nuero- surgery	23	3.2	26	3.8	22	2.4	24	3.1
Burns	14	2.0	22	3.1	19	2.1	18	2.4
Internal medicine	98	13.5	97	14.0	132	14.7	109	14.1
Intensive Care	12	1.6	22	3.1	23	2.5	19	2.5
Others	69	9.4	49	7.1	23	2.5	47	6.2

## Discussion

Of the units of PC crossmatched for the year 1995 at Harare Central Hospital, only 48.5% were collected. A total of 8 805 units were not collected for the designated patients and were returned to the general pool, while 183 expired. This translates to a total revenue loss of Z\$413 835 due to inappropriate utilization of blood banking facilities in just one of the major hospitals in Harare. The most common reason for non-collection of crossmatched blood are the demise of the patient before the planned transfusion and surgery not requiring transfusion as anticipated.

The uncollected blood packs remain outside the general blood bank pool for a minimum of 24 to 48 hours while they are in a 'crossmatched' state for designated users and are thus unavailable for other patients with blood requirements. It is assumed that packed cells and other blood products ordered and collected were all used. If some of them were not used there were no records to indicate this since they were not returned. It is therefore not possible to quantify the additional wastage incurred from this source. The overall transfusion rate of seven PC per hospital bed per year is not excessive though modern transfusion practice demands reduction of homologous blood usage to the barest minimum possible. The C/T ratio is a well established and accepted indicator of the efficiency of the clinician's ability to predict the patients

blood requirements.<sup>6</sup> Ideally, the C/T ratio should be 1:1, but a ratio of up to 2:1 is generally accepted as satisfactory. A higher ratio should trigger specific auditing into the blood ordering practices of the individual specialties within a hospital.

A number of measures may be introduced to reduce operational costs and blood wastage where a large proportion of crossmatches and transfusions are deemed to be inappropriate and haphazardly undertaken.

It is in such a situation that the development of a local Maximum Surgical Blood Ordering Schedule (MSBOS) can be a very effective guide for the ordering of blood for various conditions and scenarios.<sup>6</sup> A MSBOS guideline is especially advocated for pre-surgical orders and for maternity units.<sup>7,8</sup> These guidelines should be clearly drawn up and modified according to local expertise and prevailing conditions.

Doctors, nurses and laboratory personnel should receive in-service training on how to reduce wastage of blood and blood products, through the use of such guidelines. They should all be encouraged to participate in audit reviews on blood product usage. It is anticipated that these measures will encourage, where appropriate, the use of the "group and save" approach instead of "group and crossmatch", provided however that blood availability is guaranteed within a short time should transfusion be unexpectedly required. Such a practice significantly reduces personnel and reagent costs and conserves blood resources.<sup>9</sup>

**Conclusion:** Regular auditing of blood and blood product usage is recommended to promote the efficient use of these scarce resources. Maximum Surgical Blood Order Schedules should be further developed and blood providers and users trained in their operation. The practice of "group and save" rather than "group and crossmatch" should be promoted.

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